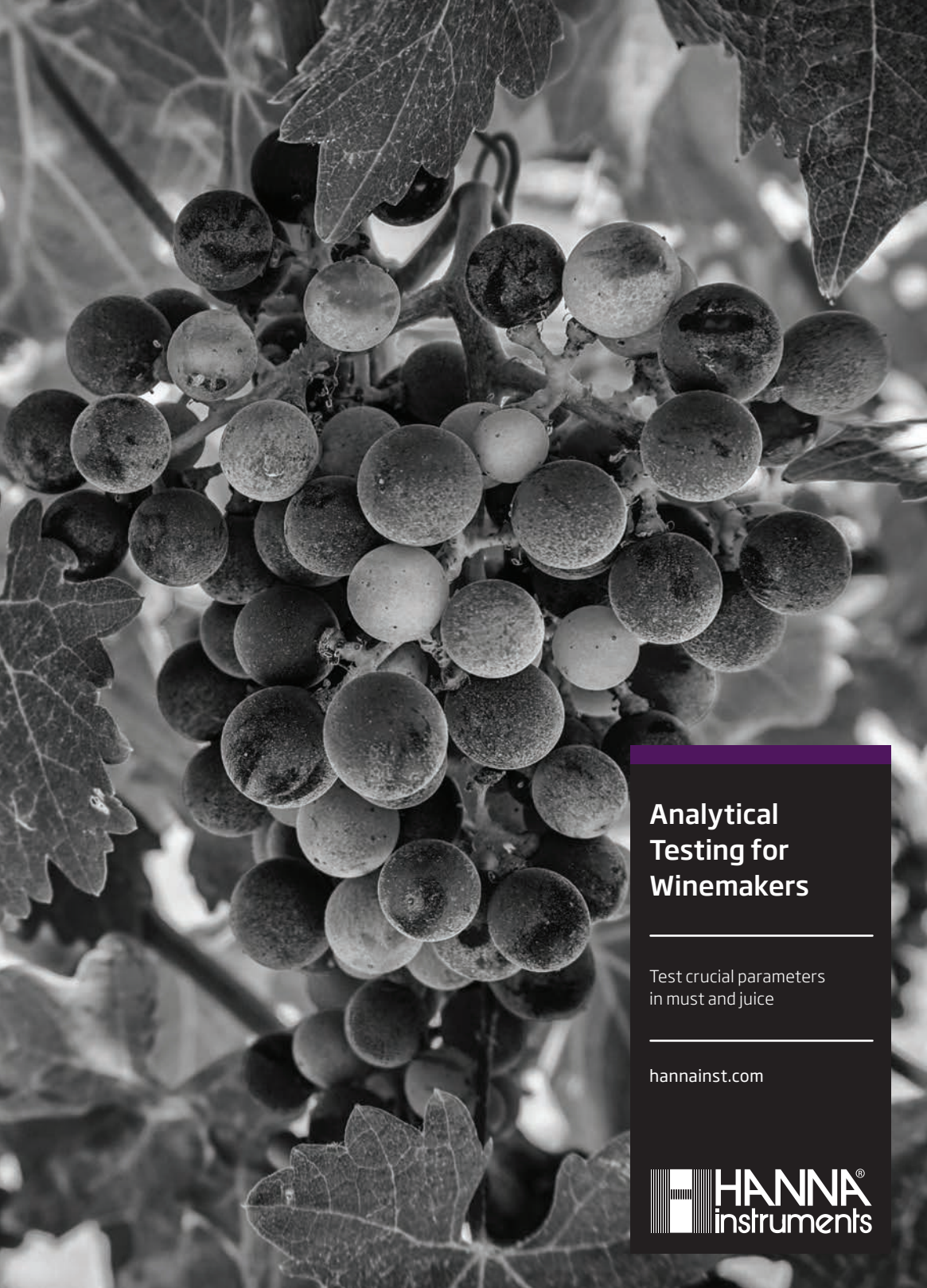


Analytical Testing for Winemakers

Test crucial parameters in must and juice

hannainst.com

HANNA® instruments

Contents

Spectrophotometer

iris portable spectrophotometer is unlike any of the products we have created in the past. It is different from our photometers as it allows for measurement in the spectrum of all wavelengths of visible light and not just pre-specified wavelengths. Spectrophotometers work by isolating light at specific wavelengths from white light. This compact meter incorporates a number of features that facilitate both fantastic performance and exceptional usability.

- Advanced split beam optical system
- Rechargeable Li-ion battery
- User customizable methods
- Step-by-step method creation
- Capacitive touchpad
- Advanced split-beam optical system
- Intuitive menu design
- Universal cuvette holder

Step-by-step method creation

The HI801 guides you step-by-step through the process of creating your own custom method. The user interface will guide you through naming your method, setting the measurement wavelengths, creating reaction timers, and calibrating the method.

Favorite methods feature

Always have your most frequently used methods readily available.

Pre-programmed methods

85 commonly used methods for chemical analysis are pre-programmed.

User methods

Program up to 100 personal methods that can include up to 10 calibration points, 5 different wavelengths (which can be used simultaneously), and 5 reaction timers.

Data logging and transfer

Store up to 9999 measurements. Data can be transferred as a CSV or PDF file.

Spectral range

The meter features a spectral range of 340nm to 900nm allowing for a wide selection of analytical methods.

Battery operated

The HI801's rechargeable lithium ion battery lasts for approximately 3,000 measurements.

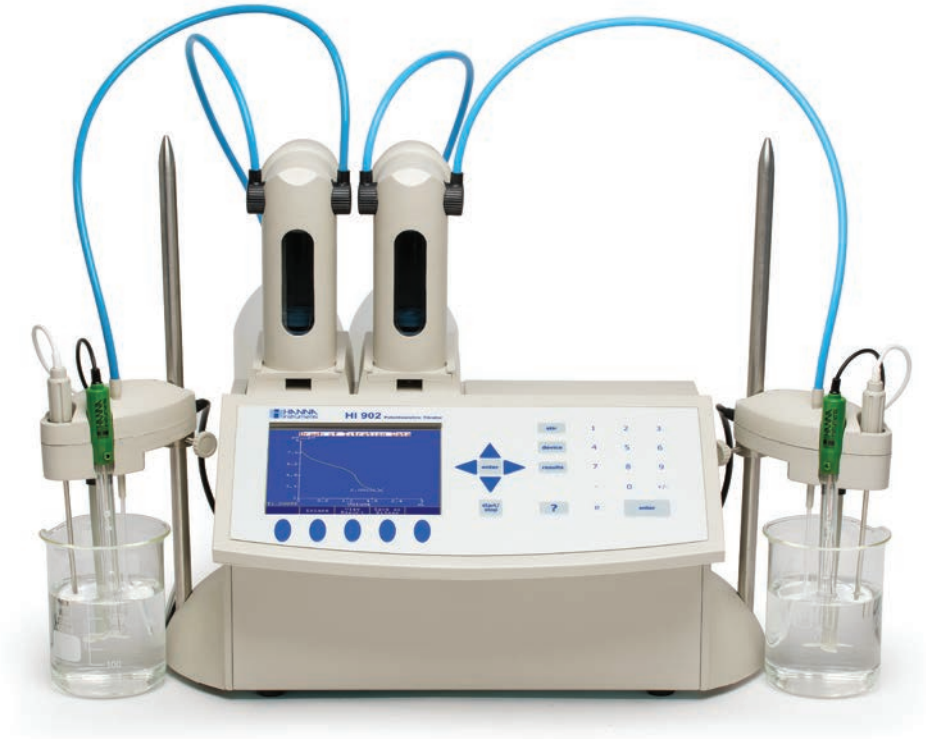

HANNA
0.61
IRON LR
iris

Wine Analysis

Acetaldehyde	Copper	Laccase	Reducing Sugar
Acetic Acid	Diacetyl	Lactic Acid	Residual Oxidants
Alcohol	Flavenoids	Malic Acid	Sorbic Acid
Alpha-amino Nitrogen	Fructose	Nitrogen	Sulfur Dioxide
Arginine (FAN)	Glucose	Non-flavenoids	Tannin (total)
Botrytis (mold)	Glycerol	Phenols	Tartaric Acid
Citric Acid	Iodine	Proline	Terpenes
Color	Iron	Protein	Urea

In addition to these critical parameters for wine, iris is pre-programmed with 85 different tests.

General Specifications	HI801 iris
Measurement Mode	transmittance (%), absorbance and concentration
Wavelength Range	340-900 nm
Wavelength Resolution	1 nm
Wavelength Accuracy	±1.5 nm
Photometric Range	0.000-3.000 Abs
Photometric Accuracy	5 mAbs at 0.000-0.500 Abs; 1% at 0.500-3.000 Abs
Wavelength Selection	automatic, based on the selected method (editable for user methods only)
Wavelength Calibration	internal, automatic at power-on with visual feedback
Light Source	tungsten halogen lamp
Optical System	split beam
Stray Light	<0.1 % T at 340 nm with $NaNO_2$
Spectral Bandwidth	5 nm
Number of Methods	150 Factory / 100 User
Sample Cell	10 mm square, 50 mm rectangular, 16 mm round, 22 mm round, 13 mm round (vial)
Data Points Stored	9999 measured values
Export Capability	csv file format, pdf file format
Connectivity	1x USB A (mass storage host); 1x USB B (mass storage device)
Battery Life	3000 measurements or 8 hours
Power Supply	15 VDC power adapter; 10.8 VDC Li-Ion rechargeable battery
Ordering Information	**HI801-01** (115V) and **HI801-02** (230V) is supplied with sample cuvettes and Caps (22 mm, 4 pcs.), cloth for wiping cuvettes, scissors, USB cable, USB flash drive, 15 VDC power adapter, instruction manual and instrument quality certificate.



Automatic Potentiometric (pH/mV/ISE) Titration System

The HI902C is an automatic titrator that complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI902C potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations, as well as back titrations and titre determinations. This powerful titrator automatically dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing. In addition to titration, the HI902C also operates as a fully functional pH, mV/ORP, and ion selective electrode (ISE) meter.

Titrator capabilities

- Dynamic titrant dosing
  - The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.
- Equivalence endpoint detection
  - Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

- Signal stability timing
  - The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.
- Multiple equivalence point detection
  - The HI902C can detect multiple equivalence points during one titration as specified and required in certain standard methods and applications.
- Method sequencing
  - The HI902C offers users the option of linking two methods. This allows for two analyses to be run on the same sample including direct measurements, single endpoint titrations, multiple equivalence point titrations, and back titrations.
- Multiple titration types
  - Paired with the right electrode from our sensor line, our potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations, as well as back titrations and titre determinations.
- Direct measurement functionality
  - The HI902C performs as a high accuracy pH, ORP, and ion selective meter that can link, log, and report direct measurements. Users can easily track and manage data without the hassle of manual record keeping.

Burettes & Dosing System

- Exchangeable burette
  - SystemWith Hanna's Clip-Lock™ burette feature, it only takes a few seconds to exchange titrants and reagents preventing cross-contamination and saving time.
- Multiple burette sizes
  - The HI902C comes standard with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette. Each burette is constructed with a ground glass syringe and chemically resistant PTFE plunger.
- Precision dosing pump
  - Our unmatched 40,000 step piston driven pump is capable of dosing extremely small and highly accurate volumes of titrant or reagent.
- Automatic reagent addition
  - A second burette may be programmed to volumetrically dispense reagent prior to titration or direct measurement. This helps achieve consistent and accurate results and prevents operator errors such as incorrect volumes or forgetting reagent addition

Interface & display

- Interactive color display
  - A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values.
- Detailed titration graphs
  - A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Data

- Data storage
  - up to 100 titration and pH/mV/ISE reports. Transfer data via USB.
- Flexible GLP management
  - All necessary GLP (Good Laboratory Practice) information can be recorded with each sample.

Connectivity & functionality

- Multifunctional
  - HI902C functions as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple analyses can be performed on one sample.
- Multiple connections
  - The titrator offers device support for two analog boards, allowing up to two electrodes, two burettes, and two stirrers to be connected to one unit simultaneously.

Methods of analysis

- Customizable methods
  - The HI902C can store up to 100 user-defined or standard titration and direct measurement methods. Each method may be modified and optimized for performance based on application and user requirements.
- Titration method support
  - Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support for any questions you might have along the way.
- Market specific methods packs
  - Hanna offers titration method packages for various markets including food, beverage, dairy, wine, and more. Ask our Sales Consultants about our library of market specific titration methods.
- Adaptable standard methods
  - Our technical experts can program and optimize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI902C system.

- Autosampler connectivity
  - The HI902C works seamlessly with our HI921 Autosampler featuring 16 or 18 sample tray options, automatic tray identification, and automatic beaker detection. Up to three peristaltic pumps for reagent addition and removal can be connected and real-time analysis and sequencing progress is visible on the HI902C display as well as indicated by the LED lights of the Autosampler.

Specifications		HI902C
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1; 0.01; 0.001 pH
	Accuracy (@25°C/77°F)	±0.001 pH
	pH Calibration	up to five-point calibration, eight standard buffers and five custom buffers
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 mV
	mV Calibration	single point offset
ISE	Range	$1 \cdot 10^{-6}$ to $9.99 \cdot 10^{10}$
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	±0.5% monovalent; ±1% divalent
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
Temperature	Range	-5.0 to 105.0°C; 23.0 to 221.0°F; 268.2 to 378.2 K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error
Additional Specifications	Burette Size Capability	5, 10, 25 and 50 mL
	Burette Resolution	1/40000
	Display Resolution	0.001 mL
	Dosing Accuracy	±0.1% of full burette volume
	Display	5.7" (320 x 240 pixel) backlit color LCD
	GLP Conformity	instrumentation data storage and printing capabilities
Ordering Information	**HI902C1-01** (US plug (type A)) and **HI902C1-02** (European plug (type C)): titrator with one analog board, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump drive, temperature sensor, USB cable, USB flash drive and PC software. **HI902C2-01** (US plug (type A)) and **HI902C2-02** (European plug (type C)): titrator with two analog boards, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.	
Accessories	**HI900100**	dosing pump
	HI900150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI900125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI900110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI900105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)

Automatic Titration System for Wine

The HI901W Wine Titrator complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI901W potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations. This powerful titrator dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphs automatically. In addition to titration mode, the HI901W also operates as a fully functional pH, mV/ORP, and ion selective electrode (ISE) meter.

This titrator is supplied with standard wine methods or you can create your own. Methods (standard or user) can be easily transferred between titrators via USB flash drive or PC application.

Methods of analysis

- Customizable methods
  - The HI901W can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.
- Titration method support
  - Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Wine Analysis

Titratable Acidity	Acid/Base Titration (pH)
Free SO_2 (Ripper)	Redox Titration (ORP)
Total SO_2 (Ripper)	Redox Titration (ORP)
Free SO_2 (AO)	Acid/Base Titration (pH)

Total SO_2 (AO)	Acid/Base Titration (pH)
Volatile Acid	Acid/Base Titration (pH)
YAN (Formal Number)	Acid/Base Titration (pH)
Reducing Sugar	Redox Titration (ORP)

Titrator capabilities

- Dynamic titrant Dosing
  - Dynamic dosing allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.
- Equivalence endpoint detection
  - Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.
- Multiple titration types
  - Paired with the right electrode from our sensor line, our potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and titrations with an ion selective electrode.
- Signal stability timing
  - The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.

Burettes and dosing system

- Exchangeable burette system
  - With Hanna's Clip-Lock burette, it only takes a few seconds to exchange titrants and reagents, preventing cross-contamination and saving time.
- Multiple burette sizes
  - The HI901W comes standard with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette.
- Precision dosing pump
  - Our unmatched 40,000 step piston driven pump is capable of dosing extremely small and precise volumes of titrant or reagent.

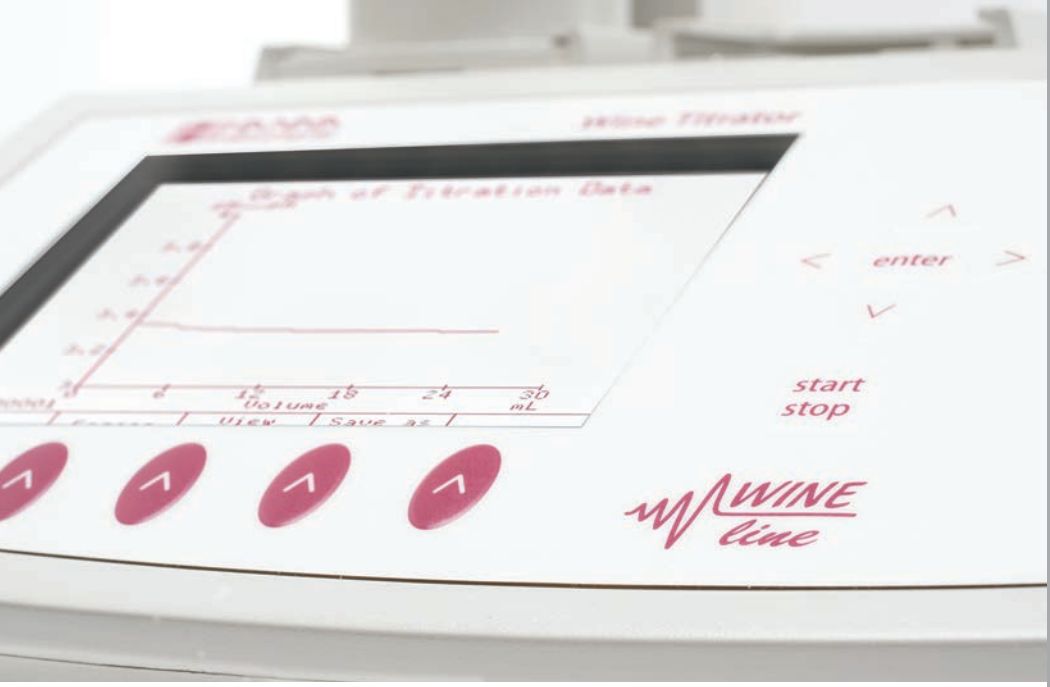
Data and storage

- Customizable titration reports
  - Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.
- Effortless data transfer
  - Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software.

Connectivity and functionality

- Multifunctional with four working modes
  - The HI901W functions as a titrator, pH meter, mV/ORP meter, and ISE meter.
- Multiple connections (HI901C2 only)
  - The titrator offers device support for two analog boards, which allows two electrodes and two stirrers to be simultaneously connected to one unit.
- Multiple peripherals
  - Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

Specifications		HI901W Wine Titrator
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1; 0.01; 0.001 pH
	Accuracy (@25°C/77°F)	±0.001 pH
	pH Calibration	up to five-point calibration, eight standard buffers and five custom buffers
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 mV
	mV Calibration	single point offset
ISE	Range	$1 \cdot 10^{-6}$ to $9.99 \cdot 10^{10}$
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	±0.5% monovalent; ±1% divalent
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
Temperature	Range	-5.0 to 105.0°C; 23.0 to 221.0°F; 268.2 to 378.2 K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error
Additional Specifications	Analog Board(s) Each Analog Board Provides: (1) BNC (pH/mV/ISE) Input, (1) Reference Input, (1)Temperature Input, (1) Stirrer Input	1
	Analog Board(s) Capability	1
	Dosing Pump Capability	2
	Burette Included	1 (25 mL)
	Burette Size Capability	5, 10, 25 and 50 mL
	Burette Resolution	1/40000
	Display Resolution	0.001 mL
	Dosing Accuracy	±0.1% of full burette volume
	GLP Conformity	instrumentation data storage and printing capabilities
Ordering Information	**HI901W-01** and **HI901W-02** includes titrator with one analog board, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.	



Yeast Available Nitrogen (YAN) titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L
HI70457	sodium hydroxide solution (1 N), 1 L

Titratable acidity titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L

Volatile acidity (VA)

Acetic acid is commonly formed during yeast growth in the early stages of fermentation. The rate and amount of acetic acid formed is partially dependent on the pH, sugar levels, available nitrogen, and temperature of the system. Typical VA levels post-fermentation range from 0.2–0.4 g/L. Any level higher could indicate microbial involvement and potential spoilage.

Volatile acidity titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L
HI70432	hydrogen peroxide solution (3%), 25 mL

pH in winemaking

The first essential step to producing a high quality wine is to measure the pH of juice and must. The measurement of pH occurs at each step of the process from pre-fermentation, fermentation, post-fermentation and at bottling.

A variety of factors and processes depend on pH including microbial stability, sulfur dioxide effectiveness, malolactic fermentation performance, protein stability, and sensory attributes.

A wine's microbial and chemical stability is influenced by pH due to the influence it has on the various forms of sulfur dioxide that will be present. Sulfur dioxide is responsible for protecting wine against oxidation and microbial activity. The molecular form of sulfur dioxide is most effective against microbes and is predominate at lower pH values. As the winemaking process progresses pH levels can change due to acid conversion and other metabolic activity. These changes require frequent monitoring of the pH values and sulfur dioxide levels of wine being stored or aged.

Most wines have a pH value between 3.0 and 4.0. White wines tend to have pH values between pH 3.0 and 3.3, while higher pH values between 3.3 and 3.5 are more common for reds. Red wines sometimes have a higher pH, in part, due to the longer contact time the grape juice has with the grape skins. Early in the winemaking process and sometimes at points throughout, it may be necessary to make acid additions in order to set and maintain an optimum pH range for the desired style or condition of the wine. The pH of finished wine may also affect its color. For example, pigment compounds in the wine express different hues of color depending on the pH.

Measuring conductivity (tartrate stability) in wine

Tartaric acid and its various forms are naturally found in grapes and wine. The principal form of tartaric acid present in wine is potassium bitartrate, commonly abbreviated as KHT. As grapes develop on the vine, potassium from the soil moves into the ripening fruit and forms soluble KHT. The presence of KHT in wine can lead to its precipitation, or formation of crystalline deposits, in a finished product. KHT crystals are the visible particles that may appear at the bottom of wine bottles during storage, export, or when chilled before consumption. While natural and harmless, it can be perceived as undesirable for a customer.

Tartrate stability can be determined through the use of a conductivity meter. When KHT crystallizes during cold stabilization, there is a loss of potassium ions as it forms a precipitate. The loss of potassium ions from solution results in a drop in conductivity. Higher drops in conductivity during the test indicate less stable wines.

HI2020W can accept the HI763100 digital conductivity probe (p. 26)

- Hanna Lab App
  Available on iOS and Android

Take pH and temperature measurements using your smart phone or tablet.

Hanna HALO Bluetooth® pH meter is designed to help anyone get high quality pH and temperature results quickly and consistently.

- All of your results, all of the time.
  - Your Hanna pH lab app collects all of your pH and temperature data.
- Highlight your most important results.
  - Push button logging highlights your data of interest and can be noted for future reference and comparison.
- Sort and share your data.
  - Group your data by time or notation. Email it for storage or share it with friends or colleagues.
- One Press Connect
  - At the press of a button connect to the Hanna Lab App via Bluetooth® wireless technology (10 m range (33')).

HI10482 HALO

HI10482 HALO is a glass body, refillable, sleeve junction wireless pH electrode with an integrated temperature sensor for temperature compensated measurements.

The application specific pH electrode is designed for the winemaker that needs to monitor the pH of wine, grape juice, and must.

This electrode features a double junction reference, Hanna's Clogging Prevention System (CPS™) technology and spherical glass sensing bulb made with general purpose glass. HI10482 HALO features a customized calibration buffer value of pH 3.00 to bracket the expected reading in wine.

- CPS technology
  - Anti-clogging PTFE sleeve that maintains stability and fast response.

WIRELESS

HI10482 HALO features clogging prevention system technology (CPS). To be used in conjunction with the Hanna Lab App for compatible smart devices or egde®blu.

HALO Specifications	HI10482
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	movable open junction
Electrolyte	3.5M KCl (refillable)
Body Material	glass
Temperature Sensor	integrated
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Ordering Information	**HI10482** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 3.00 buffer solution, fill solution, battery, quality certificate and instruction sheet.

Hanna Lab App

Available on iOS and Android

- Measure like a pro
  - Your smart device is now a professional grade pH meter wherever and whenever you need it.
- Real-time data
  - Displays updated pH and temperature every second

The first app that turns a smart phone or tablet into a full-featured pH meter.

The Hanna Lab App turns a compatible smart phone or tablet into a full-featured pH meter when used with HALO®. Functions include calibration, measurement, data logging, graphing, GLP, and data sharing. Measurement and logging of pH and temperature at one second intervals start as soon as the probe is connected. Measurements can be displayed alone, with tabulated data or as a graph. The graph can be panned and zoomed with pinch-to-zoom technology.

Views

- Just the essentials
  - Basic view provides measurement information in a clean, straightforward manner.

- All information on display
  - Table view is able to display measurement, time and date, annotations, and alarm status in a continuously updated table.

- Fluid, dynamic graphing
  - Graph view provides measurement information linearly. Graph axes may be expanded using pinch-to-zoom technology for enhanced viewing

Hanna Lab App Specifications*	
Range**	-2.000 to 16.000 pH; ±800 mV; -20.0 to 120.0°C (-4.0 to 248.0°F)
Resolution	0.1; 0.01; 0.001 pH; 1; 0.1 mV; 0.1°C (0.1°F)
Accuracy (@25°C/77°F)	±0.005 pH; ±0.3 mV; ±0.5°C (±1.0°F)
Calibration Points	up to five-point calibration with seven standard buffers (1.68, 3.00 (HI10482 only) or 4.01, 6.86, 7.01, 9.18, 10.01, 12.45 pH)
Temperature Compensation**	automatic from -5.0 to 100.0 °C – 23.0 to 212.0 °F
Compatibility/System Requirements	see www.hannainst.com for latest compatibility requirements
Download Information	Download on the App Store ANDROID APP ON Google Play

*HALO™ required for measurement use.
** limits will be reduced to actual probe/sensor limits.

Laboratory Research Grade Two-Channel Benchtop pH/mV/ISE Meter

The HI5222 is an advanced research grade dual channel benchtop pH/ISE/mV meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. The HI5222 is rich in features including five-point calibration, selectable resolution, data logging, alarm limits, comprehensive GLP, automatic temperature compenstion, and much more. It retains simplicity with both dedicated key for routine operation and virtual keys that guide the user through setup options.

- Highly customizable user interface
  - The user interface can display measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data.
- Capacitive touch
  - Sensitive capacitive touch buttons ensures the buttons cannot be clogged with sample residue.
- Color graphic LCD
  - The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.
- Two galvanically isolated pH/ORP/ISE channels
  - Each input channel has connectors for BNC probes, reference probes and a temperature sensor.

- Choice of calibration
  - Automatic buffer recognition, semi-automatic, and direct manual entry pH calibration options are available.
- GLP data
  - View calibration data and calibration expiration information.
- CAL Check™
  - CAL Check™ alerts users to potential problems during the calibration of the pH electrode.
- ISE measurement with choice of concentration units
  - Allows for calibration and readings in choice of concentration units which include ppt, g/L, mg/mL, ppm, mg/L, µg/mL, ppb, µg/L, mg/mL, M, mol/L, mmol/L, %w/v and a user-defined unit.
- ISE measurement with incremental methods
  - The known addition, known subtraction, analyte addition, and analyte subtraction incremental methods are pre-programmed.
- Data logging
  - Automatic, manual, and AutoHold logging are available. Automatic and manual logs up to 100 lots with 50,000 records max/lot with up to 100,000 total data points per channel.

HI5222 includes HI1131B pH electrode and is also compatible with pH electrodes that use BNC and BNC+PIN connectors and ISE electrodes that use BNC connectors.

Specifications		HI5222
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five point calibration, eight standard buffers available (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45), and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
ISE	Range	1×10^{-6} to 9.99×10^{10} concentration
	Resolution	1; 0.1; 0.01; 0.001 concentration
	Accuracy	±0.5% (monovalent ions); ±1% (divalent ions)
	Calibration	automatic, up to five-point calibration, seven fixed standard solutions available for each measurement unit, and five user defined standards
Temperature*	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Ordering Information		**HI5222-01** (115V) and **HI5222-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

* limits will be reduced to actual sensor limits

Laboratory Research Grade Benchtop pH/ mV Meter with 0.001 pH Resolution

The HI5221W is an advanced research grade benchtop pH/mV meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. The HI5221W is rich in features including five-point calibration, selectable resolution, data logging, alarm limits, comprehensive GLP, automatic temperature compenstion, and much more.

- Highly customizable user interface
  - The user interface can display measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data.
- Capacitive touch
  - Sensitive capacitive touch buttons ensures the buttons cannot be clogged with sample residue.
- Color graphic LCD
  - The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.
- Choice of calibration
  - Automatic buffer recognition, semi-automatic, and direct manual entry pH calibration options are available. and up to five custom buffers.

- GLP data
  - View calibration data and calibration expiration information.
- CAL Check™
  - CAL Check™ alerts users to potential problems during the calibration of the pH electrode.
- Data logging
  - automatic, manual, and AutoHold logging are available. Automatic and manual logs up to 100 lots with 50,000 records max/lot with up to 100,000 total data points per channel.
- Data transfer
  - Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

- CPS technology
  - Anti-clogging PTFE sleeve that maintains stability and fast response.

- HI1048B pH electrode
  - The HI5221W for wine uses the glass body HI1048B pH electrode with Hanna's unique Clogging Prevention System (CPS™). This electrode provides a fast stable response and resists clogging. The electrolyte solution in the electrode is refillable.

HI5221W includes HI1048B pH electrode for wine with clogging prevention system technology (CPS) and is also compatible with pH electrodes that use BNC and BNC+PIN connectors.

Specifications		HI5221W
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five point calibration, eight standard buffers available (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45), and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
Temperature*	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Ordering Information	**HI5221W-01** (115V) and **HI5221W-02** (230V) are supplied with HI1048B pH with CPS technology, HI7662-T temperature probe, pH 4.01 buffer solution sachets (2), pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachets (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.	

* limits will be reduced to actual sensor limits

edge® Multiparameter pH Meter

edge's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. edge is only 0.5" thick yet rich in features to accommodate the needs of a vast amount of customers. For those that prefer very simplistic operation there is a basic mode operation with a simplified menu and options. For those who require advanced features there is the full featured standard operating mode. The edge HI2020 pH kit can be upgraded at any time with additional probes to measure Conductivity or Dissolved Oxygen.

Hybrid meters that can be used in portable, wall-mount and benchtop configurations

- Portable field unit

- Wall-mount cradle

- Electrode holder with built-in cradle

- Capacitive touch keypad
  - edge® features sensitive capacitive touch buttons that cannot get clogged with sample residue.
- Rechargeable battery
  - edge's built-in rechargeable battery can be charged through the micro USB port, benchtop cradle, or wall-mount cradle.

- Two USB ports
  - edge includes one standard USB for data export and one micro USB port for data export to your computer as well as for charging when the cradle is not available.

HI2020W includes HI10480 pH electrode for wine with clogging prevention system technology (CPS). All edge compatible pH, EC and dissolved oxygen digital probes are interchangeable with edge.

- Data logging
  - edge allows you to store up to 1000 log records of data. Data sets include readings, GLP data, date and time.
- GLP
  - Data of the last calibration you perform is stored in the sensor including the date, time, and buffers used.
- CAL Check™
  - CAL Check analyzes the pH electrode response in the pH buffers during the calibration process to alert the user of potential problems such as a contaminated buffer or dirty electrode.
- Digital electrodes
  - edge measures pH, conductivity and dissolved oxygen through its unique digital electrodes. These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge by an easy to plug-in 3.5mm connector.

Specifications		HI2020W
pH*	Range	-2.00 to 16.00 pH; -2.000 to 16.000 pH†
	Resolution	0.01 pH; 0.001 pH†
	Accuracy (@25°C/77°F)	±0.01 pH; ±0.002 pH†
	Calibration	automatic, up to five points (Standard mode) 1.68, 4.01 (3.00†), 6.86, 7.01, 9.18, 10.01, 12.45, and two custom buffers; up to three points (Basic mode) 4.01; 6.86; 7.01; 9.18; 10.01
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
Temperature*	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Ordering Information	**HI2020W-01** (115V) and **HI2020W-02** (230V) pH kit includes: HI10480 pH and temperature probe with CPS technology, pH 4 buffer solution sachets (4), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2), and electrode cleaning solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.	
Accessories	**HI763100**	edge compatible digital conductivity probe
	HI764080	edge compatible digital dissolved oxygen probe

* limits will be reduced to actual sensor limits
† standard mode only

Portable Wine Must and Grape Juice pH Meter

The Hanna HI99111 is a durable, waterproof, and portable pH and temperature meter designed specifically for measurement of juices including grape juice and wine must. Automatic calibration is performed at one or two points with two sets of buffers. The calibration buffers include a pH 3.00 calibration point instead of pH 4.01 in order to better bracket the expected pH value. All calibration and measurement readings are automatically compensated for temperature variations. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration instructions. The HI99111 uses the HI1048D glass body, amplified pH electrode that offers numerous features that improve pH testing for a variety of juices with a high solids content.

- Waterproof
  - The HI99111 is a waterproof meter rated IP67 for immersion in up to one meter of water for 30 minutes.
- Automatic calibration
  - One or two-point calibration is automatic to two selectable buffer sets.
- Automatic temperature compensation
  - An integrated temperature sensor allows for automatic temperature compensation of pH measurements.
- Multi-level LCD display
  - The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration instructions.
- On-screen tutorial
  - Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration.
- Battery error prevention system
  - The meter will automatically shut off if there isn't enough power to obtain an accurate measurement.
- Battery life indicator
  - The battery percent level is displayed at start up alerting the user to the remaining battery power that is available.

- CPS technology
  - Anti-clogging PTFE sleeve that maintains stability and fast response.
- HI1048D pH electrode
  - The HI99111 portable pH meter for wine uses the glass body HI1048D pH electrode with Hanna's unique Clogging Prevention System (CPS™). This electrode provides a fast stable response and resists clogging. The electrolyte solution in the electrode is refillable.

D
DIN

HI99111 includes HI1048D pH electrode for wine with clogging prevention system technology (CPS).

Specifications		HI99111
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
Temperature*	Range	-5.0 to 105.0°C; 23.0 to 221.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C (up to 60°C), ±1.0°C (outside); ±1.0°F (up to 140°F), ±2.0°F (outside)
Ordering Information	**HI99111** is supplied with HI1048D pH and temperature probe, pH 3.00 buffer solution sachet, pH 7.01 buffer solution sachet, electrode cleaning solution sachet for wine deposits and electrode cleaning solution sachet for wine stains, batteries, instructions and hard carrying case.	

* limits will be reduced to actual sensor limits

pHep+ Waterproof Pocket pH Tester with 0.01 pH Resolution

- Large multi-level LCD
  - Displays both the pH and temperature simultaneously.
- Two-button operation
- Extractable cloth junction to extend pH electrode life
- Integrated temperature sensor
  - Allows for Temperature Compensated measurements.
- Automatic calibration
  - Automatic calibration to one or two points using standard buffers (pH 4.01, 7.01 and 10.01).
- Stability indicator
  - A clock tag stability indicator will disappear to alert the user when the reading is stable.
- User selectable automatic shut-off
  - Options are 8 min, 60 min or disabled.
- Low battery indicator
- Battery % level at startup

Specifications		HI98108 (pHep®+)
pH	Range	0.00 to 14.00 pH
	Resolution	0.01 pH
	Accuracy (@25°C/77°F)	±0.10 pH
	Calibration	automatic, one or two-points (pH 4.01, 7.01, 10.01)
Temperature	Range	0.0 to 50.0 °C (32.0 to 122.0 °F)
	Resolution	0.1°C / 0.1°F
	Accuracy (@25°C/77°F)	±0.5°C /±1.0°F
Ordering Information	**HI98108** (pHep+) is supplied with CR2032 Li-ion battery, electrode cleaning solution sachet, pH 4.01 buffer solution sachet, pH 7.01 buffer solution sachet (2), storage/ protection sleeve, instruction manual and quality certificate.	

pH Buffer Solutions

(±0.01 pH)

These solutions are dedicated to applications that require extremely accurate pH monitoring, and come with a certificate of analysis prepared by comparison against NIST standards.

- Two-point calibration
  - To obtain precise and valid pH measurements, the pH meter and electrode must be calibrated at a minimum of two different points.

Bottles

pH Value @25°C	Code	Package
3.00	**HI5003**	500 mL
4.01	**HI5004**	500 mL
	HI5004-01	1 L
	HI5004-R	500 mL (color coded solution)
	HI5004-R08	1 G (3.78 L), color coded solution (2)
7.01	**HI5007**	500 mL
	HI5007-01	1 L
	HI5007-G	500 mL, color coded solution
	HI5007-G08	1 G (3.78 L), color coded solution (2)
	HI5010	500 mL
	HI5010-01	1 L
	HI5010-V	500 mL (color coded solution)
	HI5010-V08	1 G (3.78 L), color coded solution (2)

Single-use sachets

pH Value @25°C	Code	Package
3.00	**HI50003-02**	20 mL (25)
4.01	**HI50004-02**	20 mL (25)
7.01	**HI50007-02**	20 mL (25)
10.01	**HI50010-02**	20 mL (25)

Cleaning Series

- Clean sensors weekly
  - Clean the sensing portion of your electrodes weekly to prevent fouling and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15 to 20 minutes, rehydrate in storage solution and calibrate before use.

Specific Use Electrode Cleaning Solutions

In many applications, electrodes become contaminated from use and produce inaccurate results. Since these contaminants cannot be removed during normal rinsing, special cleaning solutions are needed.

The Cleaning Series ensures maximum efficiency and accuracy of your sensors when used for its designated application. Electrode cleaning is a fast and effective routine that should be performed on a regular basis as a preventative measure against using a dirty electrode and to ensure that the junction is not clogged.

Bottles

Code	Description	Size
HI70635L	cleaning solution for wine deposits **(winemaking)**	500 mL
HI70636L	cleaning solution for wine stains **(winemaking)**	500 mL

Sachets

Code	Description	Size
HI700635P	cleaning solution for wine deposits **(winemaking)**	20 mL (25)
HI700636P	cleaning solution for wine stains **(winemaking)**	20 mL (25)

Electrode Storage and Filling Solutions

Electrode storage solutions

Code	Description
HI70300L	electrode storage solution, 500 mL
HI70300M	electrode storage solution, 230 mL

Electrode filling solutions

Code	Description
HI7082	electrolyte solution, 3.5M KCl, 30 mL bottle (4)
HI7082M	electrolyte solution, 3.5M KCl, 230 mL
HI7082L	electrolyte solution, 3.5M KCl, 460 mL

Electrode filling accessories

Code	Description
HI740157P	Electrode filling pipettes (20)

Clean sensors weekly

Clean the sensing portion of your electrodes weekly to prevent fouling and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15 to 20 minutes, rehydrate in storage solution and calibrate before use.

Keep bulb and junctions moist

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI70300 storage solution in the protective cap.

Top-off electrolyte levels if needed

The electrolyte level in refillable electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution to ensure correct electrode performance. This simple maintenance helps guarantee adequate head pressure to keep the liquid junction flowing.

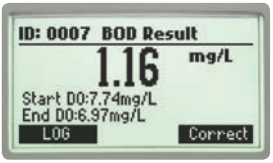
Measuring dissolved oxygen in wine

Oxygen is potentially introduced at several stages of the winemaking process from fermentation, where it may be sometimes desirable, to movement and filtration where high oxygen uptake can be detrimental to an aging or finished product. Regardless of the process, packaging, or closure, it's extremely important that the dissolved oxygen levels of a finished product be as low as possible at the time of packaging, typically under 0.5 ppm.

Waterproof Portable Dissolved Oxygen and BOD Meter

The HI98193 is a rugged, portable dissolved oxygen (DO) meter designed for demanding applications. This professional, waterproof meter complies with IP67 standards and measures DO, barometric pressure, BOD and temperature. The HI98193 is supplied complete with all accessories to perform a DO measurement packaged into a durable carrying case.

- Backlit graphic LCD display
  - The HI98193 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.
- Waterproof protection
  - The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.
- Data logging
  - The HI98193's log on-demand feature allows users to store up to 400 readings. This data can then be transferred to a PC with the HI920015 USB cable and HI92000 software.
- Quick connect probe
  - Quick connect DIN connector makes attaching and removing the probe simple and easy.
- Measurement
  - The HI98193 has extended ranges of up to 50 ppm and 600% saturation. When measuring dissolved oxygen, compensations for salinity, temperature and pressure are essential to improve the accuracy and precision of readings.
- AutoHold
  - Pressing AutoHold during measurement will automatically hold the first stable reading on the display.



- BOD results
  - BOD is calculated in mg per liter from the difference between the initial and final dissolved oxygen
- BOD parameters and records
  - All necessary parameters for BOD testing can be set and displayed at once. A list of all saved BOD data can be easily retrieved and shown on the LCD display.
- OUR results
  - Measured in mg of oxygen consumed per L per hour.
- SOUR results
  - Measured in mg of oxygen consumed per g of volatile suspended solids per hour.
- Built-in barometer
  - With the internal barometer, the HI98193 is able to compensate for changes in barometric pressure so there is no need for charts, altitude information or external barometric pressure information.
- GLP
  - Comprehensive GLP functions are directly accessible by pressing the GLP key. Calibration data, including date, time and calibration values are stored for retrieval at a later time.

QUICK DIN

HI98193 includes HI764073 polarographic DO probe and protective sleeve with a quick connect DIN connector to make attaching and removing the probe simple and easy.

Specifications		HI98193
DO	Range	0.00 to 50.00 mg/L (ppm); 0.0 to 600.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@25°C/77°F)	±1.5% of reading ±1 digit
	Calibration	automatic one or two point at 100 % (8.26 mg/L) and 0 % (0 mg/L).; manual one point using a value entered by the user in % saturation or mg/L
Atmospheric Pressure	Range	450 to 850 mmHg
	Resolution	1 mmHg
	Accuracy (@25°C/77°F)	± 3 mmHg within ±15% from the calibration point
	Calibration	one point at any in range pressure value
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy (@25°C/77°F)	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two point at any in range temperature value
Ordering Information	**HI98193** is supplied with HI764073 polarographic DO probe with protective sleeve, HI7040 bi-component zero oxygen solution (230 mL + 30 mL), HI7041S electrolyte solution (30 mL), preformed PTFE membrane caps (2), DO protective cap, O-rings (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720193 rugged carrying case with custom insert.	

Sulfur dioxide (SO_2) in winemaking

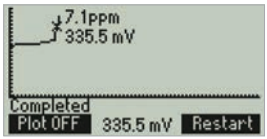
Early in the winemaking process winemakers add sulfur dioxide (SO_2) to wine in order to inhibit bacteria and wild yeast growth, although this is typically considered only if malolactic fermentation isn't intended. Later in the process after fermentation SO_2 is added to wine as an antioxidant and for its antimicrobial properties. As an antioxidant SO_2 helps preserve the color, flavor, and stability of the wine. As an antimicrobial SO_2 interferes with the metabolic pathways of yeast and bacteria.

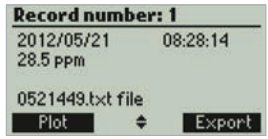
When SO_2 is added to wine, a portion of it becomes immediately bound while a remaining portion is unbound SO_2. The portion that is unbound is also called free SO_2 and it is responsible for protecting the wine. The bound and free SO_2 together are referred to as total SO_2.

Free SO_2 exists in two forms. The first form, bisulfite (HSO_3^-), is the predominant form but is relatively ineffective. The second form, molecular SO_2, is the minor form and is responsible for protecting the wine. The amount of molecular SO_2 available in wine is dependent upon the amount of free SO_2 present and the pH. Typically 0.8 ppm of molecular SO_2 provides adequate protection against bacteria growth and oxidation.

Mini Titrator for Measuring Sulfur Dioxide

The HI84500 can be used to test for free and total SO_2 in all wines, including red, which are difficult to test using traditional methods due to the inability to see the distinctive color change that occurs at the endpoint. The HI84500 offers a reliable, accurate, and fast way to analyze free and total sulfur dioxide. This mini titrator dispenses the titrant, detects the endpoint, and performs all necessary calculations automatically in a fraction of the time as compared to a manual titration. As found in Triage for Basic Wine/Grape Lab by Richard Carey, "the mini-titrator by Hanna reduces the time for an individual analysis by 75%."





- Graphic mode
  - This mini titrator displays in-depth data during titration, including a real-time graph of the titration curve.
- Log-on-demand
  - The HI84500 allows for data logging of up to 400 samples: 200 titration results and 200 ORP/mV readings. Data can be stored and exported to a USB drive or a PC using the USB connection.

- Application-specific ORP electrode with CPS™
  - The HI84500 is supplied with the HI3148B ORP electrode featuring CPS technology to prevent the clogging of the reference junction. Conventional electrodes may clog quickly in samples such as wine that have a high suspended solids content. By design, the HI3148B 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 repel wetness and coatings.

HI84500 includes HI3148B glass bodied ORP electrode with CPS™ Technology and a BNC connector.

Specifications		HI84500
Titrator	Range	Low Range: 1.0 to 40.0 ppm of SO_2 High Range: 30 to 400 ppm of SO_2
	Resolution	Low Range: 0.1 ppm High Range: 1 ppm
	Accuracy (@25°C/77°F)	Low Range: ±0.5 ppm or 3% of reading, whichever is greater High Range: ±1 ppm or 3% of reading, whichever is greater
	Sample Volume	50 mL
	Method	Ripper method
	Principle	equivalence point redox titration
	Pump speed	10 mL/min
ORP Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±1 mV
Ordering Information	**HI84500-01** (115V) and **HI84500-02** (230V) are supplied with HI3148B ORP electrode, HI7082 electrode fill solution (30 mL), HI84500-70 reagent kit for SO_2 determination (consisting of: 1 bottle HI84500-50 (230 mL) low range titrant, 1 bottle HI84500-51 high range titrant (230mL), 1 bottle HI84500-55 pump calibration standard (120 mL), 1 bottle HI84500-60 acid reagent (230 mL), 1 bottle HI84500-61 alkaline reagent (120 mL) and HI84500-62 stabilizer packets (100 packets)), 100 mL beakers (2), 20 mL beakers (2), scissors, dosing pump valve, 5 mL syringe, 1 mL plastic pipette, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, cleaning solution sachets for wine deposits (2), cleaning solution sachets for wine stains (2), 12 VDC adapter and instruction manual.	
Reagents	**HI84500-50**	titrant solution for low range, 230 mL
	HI84500-51	titrant solution for high range, 230 mL
	HI84500-55	pump calibration standard, 120 mL
	HI84500-60	acid reagent, 230 mL
	HI84500-61	alkaline reagent (Total SO_2), 120 mL
	HI84500-62	stabilizer powder packets (100)

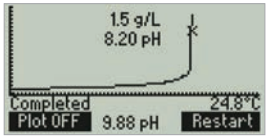
Titratable Acidity (TA) in winemaking

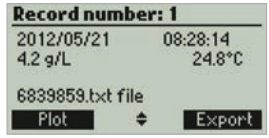
The amount of acid present in a wine can directly affect its color and flavor, and can serve to balance the sweeter or more astringent wine components. This balance is challenging as too much acid may make a wine tart or sharp, while too little may make a wine flat or flabby. Proper acidity in wine is important to making the wine stable, palatable, and a refreshing accompaniment to food. The proper acid level of a finished wine can vary based on the wine's desired style, with sweeter wines usually requiring somewhat higher levels of acidity to maintain proper balance with their sweeter components.

Understanding the relationship between pH and acidity is important throughout the entire winemaking process to ensure a stable, quality product. This relationship is complex since pH is the measurement of hydrogen ion activity and acidity is the concentration or buffering capacity of a particular acid. For example, adding more acid to a wine may not appreciably affect the pH because of compounds such as phenols and other acids present that act in a buffering capacity. If a pH adjustment is required, tartaric acid addition is generally preferred because it is relatively stable and is a stronger acid than malic or citric, yielding a greater pH adjustment per amount used. The complex correlation between pH and TA makes it crucial to assess both parameters before and after making any adjustments.

Mini Titrator for Measuring Titratable Acidity

The HI84502 is a simple, fast, and affordable automatic mini titrator designed for testing total acidity levels in wine. Based on an acid-base titration method, this mini titrator uses an optimized preprogrammed method of analysis with a powerful algorithm that determines the completion of the titration reaction by the use of a specialized wine pH electrode.





- Graphic mode
  - Displays in-depth data during titration, including a real-time graph of the titration curve.
- Log-on-demand
  - Data log up to 400 samples: 200 titration results and 200 pH/mV readings. Data can be stored and exported to a USB drive or a PC using the USB connection.

- Application-specific pH electrode with CPS™
  - The HI84502 is supplied with the HI1048B glass body pH electrode featuring CPS™technology to prevent the clogging of the reference junction. Conventional electrodes may clog quickly in biological samples that have a high solids content such as wine must. By design, the HI1048B pH electrode utilizes a polytetrafluoroethylene (PTFE) sleeve junction which controls a steady, predictable flow of electrolyte solution, keeping the junction open. The hydrophobic properties of PTFE repel wetness and coatings.

HI84502 includes HI1048B glass bodied pH electrode with CPS™ Technology and a BNC connector.

Specifications		HI84502
Titrator	Range	Low Range: 0.1 to 5.0 g/L (ppt) of tartaric acid High Range: 4.0 to 25.0 g/L (ppt) of tartaric acid
	Resolution	0.1 g/L (ppt)
	Accuracy (@25°C/77°F)	±0.1 g/L or 3 % of reading, whichever is greater
	Method	acid-base titration
	Sample Volume	Low Range: 10 mL; High Range: 2 mL
	Principle	endpoint titration: 7.00 pH or 8.20 pH
	Pump speed	10 mL/min
pH	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH / 0.01 pH
	Accuracy (@25°C/77°F)	±0.01 pH
	Calibration	one, two or three-point calibration, four available buffers (4.01, 7.01, 8.20, 10.01)
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±1.0 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Ordering Information	**HI84502-01** (115V) and **HI84502-02** (230V) are supplied with HI1048B pH electrode, HI7662-T temperature probe, HI7082 electrode fill Solution (30 mL), HI84502-70 reagent kit (consisting of: 1 bottle HI84502-50 (230 mL) titration solution and HI84502-55 (120 mL) pump calibration standard (1 bottle)), (2) 100 mL beakers, dosing pump valve, 2000 µL, automatic pipette with plastic tips (2), 5 mL syringe, 1 mL plastic pipette, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, cleaning solution sachets for wine deposits, cleaning solution sachets for wine stains (2), 12 VDC adapter and instruction manual.	
Reagents	**HI84502-50**	titrant solution, 230 mL
	HI84502-55	pump calibration standard, 120 mL

Refractometers for Total Soluble Solids (TSS)

During the grape growing season, winemakers and vineyard managers monitor the composition of the grapes as an indicator of potential style and harvest time. Along with acidity, pH, and a host of other parameters, sugar content is one of these essential components. Depending on style, the amount of sugar present determines when the grape can be harvested.

Grape or cluster samples are strategically selected from the vineyard and carefully crushed and clarified into juice. The sugar, or total soluble solids (TSS) content can then be analyzed by a refractometer. Sugar accounts for 90 to 94% of the total soluble solids present. Typical units for TSS in the wine industry are °Brix, where 1 °Brix equals 1 gram of sugar per 100g of solution. Other units such as °Baume or Specific Gravity are used as well.


hannainst.com

Digital Refractometers for Analysis in Wine, Must and Juice

Five instruments for wine analysis

Hanna offers five wine refractometers to meet the various requirements throughout the wine industry. The HI96811, HI96812, HI96813, HI96814 and HI96816 Digital Wine Refractometers are rugged, lightweight and waterproof for measurements in the lab or field.

Refractive index

These optical instruments employ the measurement of the refractive index to determine parameters pertinent to the wine industry.

The actual measurement of the refractive index is simple and quick and provides the vintner a standard accepted method for sugar content analysis. Samples are measured after a simple user calibration with deionized or distilled water. Within seconds, the instrument measures the refractive index of the grape must. These digital refractometers eliminate the uncertainty associated with mechanical refractometers and are ideal for fast, reliable measurements.

- One-point calibration
  - Calibrate with distilled or deionized water
- Small sample size
  - Sample size can be as small as 2 metric drops (100 µL)
- Automatic Temperature Compensation (ATC)
  - Samples automatically compensated for temperature variations
- Quick, accurate results
  - Readings are displayed in approximately 1.5 seconds
- Dual-level LCD
  - The dual-level LCD displays % Brix and temperature readings simultaneously
- Stainless steel sample well
  - Sealed stainless steel well with high-grade optical prism made of flint glass. Easy to clean and corrosion-resistant.
- Battery indicators
  - Battery percent level remaining at startup and low battery indicator
- Automatic shut-off
  - To conserve battery life the meter shuts off automatically after three minutes of non-use
- IP65 water resistant
  - Water resistant ABS plastic casing designed to perform under laboratory and field conditions.

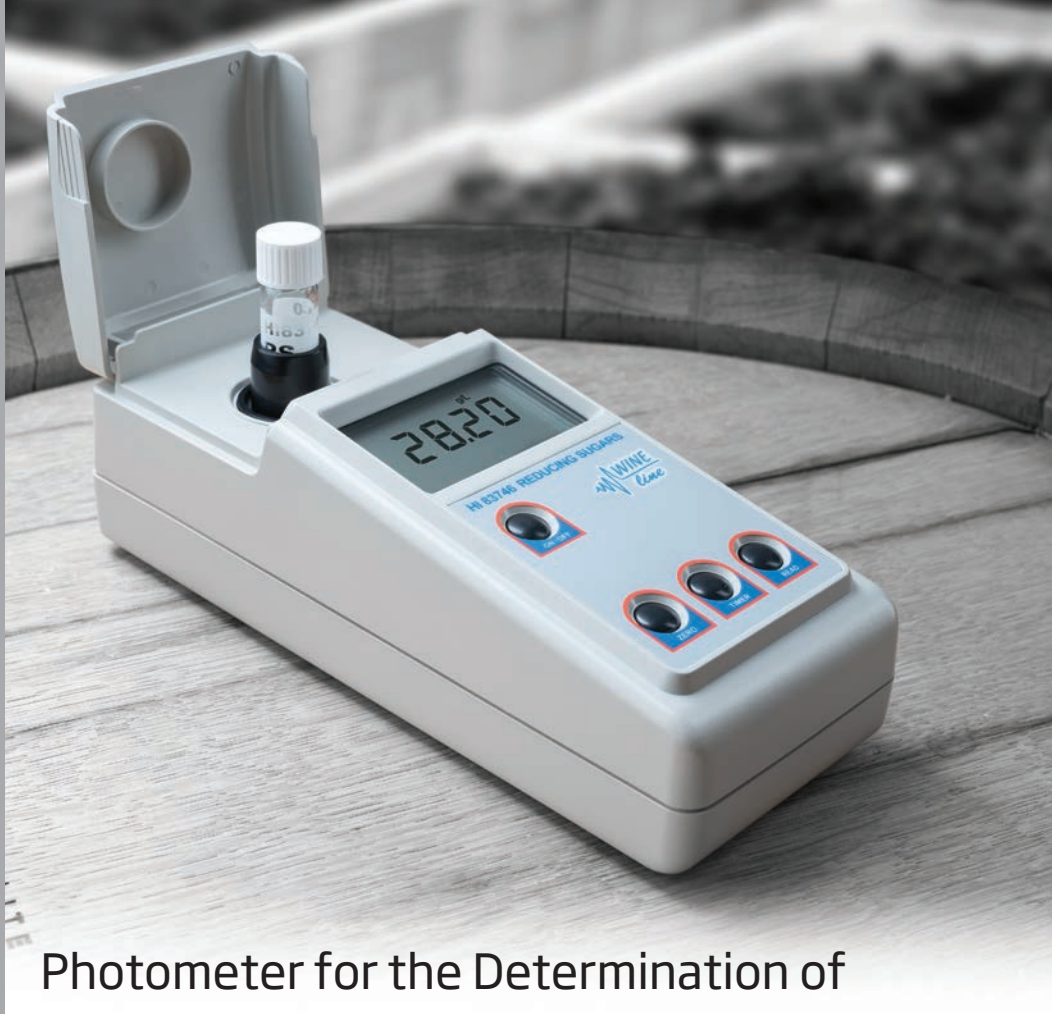
Specifications		HI96811	HI96812	HI96813	HI96814	HI96816
Sugar Content	Range	0 to 50% Brix	0 to 28°Baumé	0 to 50% Brix; 0 to 25% V/V Potential Alcohol	0 to 50% Brix; 0 to 230°Oechsle; 0 to 42°KMW	4.9 to 56.8% V/V potential alcohol; (10 to 75% Brix)*
	Resolution	0.1% Brix	0.1°Baumé	0.1% Brix; 0.1% V/V Potential Alcohol	0.1% Brix; 1°Oechsle 0.1°KMW	0.1 %V/V Potential Alcohol
	Accuracy (@25°C/77°F)	±0.2% Brix	±0.1°Baumé	±0.2% Brix; ±0.2 %V/V Potential Alcohol	±0.2% Brix; 1°Oechsle ±0.2°KMW	±0.2 %V/V Potential Alcohol
Temperature	Range	0 to 80°C (32 to 176°F)				
	Resolution	±0.1°C (0.1°F)				
	Accuracy (@25°C/77°F)	±0.3°C (±0.5°F)				
Ordering Information	**HI96811**, **HI96812**, **HI96813**, **HI96814** and **HI96816** are supplied with battery and instruction manual.					
Standard	**HI4020-11** Brix standard 50%, 10 mL					
Solution	**HI93703-50** cuvette cleaning solution, 230 mL					

Measuring Reducing Sugars in Wine

During alcoholic fermentation, yeast consume sugars found in the grape juice or must and convert it to ethyl alcohol and carbon dioxide. In the case of certain styles of wine such as semi-sweet or dessert wines, some sugar is allowed to remain post-fermentation. This residual sugar can serve to provide a sweeter character to the final blend or play a role in microbial stability.

The primary fermentable sugars found in grapes are glucose and fructose. These two simple sugars are also known as reducing sugars because they contain functional groups capable of being oxidized under certain conditions. A winemaker interested in confirming the residual sugar content of a product post-fermentation, or a finished wine product, can use a redox titration to facilitate the oxidation and analysis of these sugars.

For this titration, an alkali solution of copper complex, known as Fehling's reagent, is combined with a sample of wine. Catalyzing the reaction with heat, the reducing sugars present reduce the copper from Cu(II) to Cu(I). Potassium iodide is added to reduce any excess Cu(II), resulting in iodine as a product. The iodine, present in an amount equal to the residual Cu(II), is then titrated with sodium thiosulfate to determine the original amount of residual sugar present in the wine sample. The results are reported as g/L of reducing sugar.



Photometer for the Determination of Concentration of Reducing Sugars

The HI83746 photometer is for the determination of reducing sugars in wine. Hanna's photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals.
- Error messages
  - Messages on display alert to possible measurement problems.
- Zero key
  - A simple press of the zero key on the face of the meter will account for the color and imperfections in the oil sample before reagent addition.
- GLP
  - Review of the last calibration date.

Specifications	HI83746	
Range	0.00 to 50.00 g/L (ppt)	
Resolution	0.25 g/L	
Accuracy @ 25°C/77°F	± 0.50 g/L ±5% of reading	
Precision	±0.015 @ 0.350 g/L	
Method	Fehling	
Ordering Information	**HI83746-01** (115V) and **HI83746-02** (230V) is supplied with glass cuvettes and caps (4), reagents for about 20 tests (HI83746-20), HI93703-59 Charcoal, 200 µL automatic pipette with two plastic tips, 1000 µL automatic pipette with plastic tips (2), instruction sheet for automatic pipette, spoon, funnel, filter paper (25), cuvette wiping cloth, 12 VDC adapter, batteries, instructions and Instrument quality certificate, rigid carrying case.	
Optional Reagents	**HI83746-20**	reducing sugar reagent set (20 tests)
	HI93703-59	charcoal for decoloration of red wine (about 100 tests)
	HI839800	COD test tube heater (required)

COD Test Tube Heater

with 25 Vial Capacity

- Predefined Temperature Settings
- Temperature Alerts
- Built-in Timer
- Status Indicator Lights
- Overheating Prevention
- Reference Temperature Well

The HI83746 requires the HI839800 Test Tube Heater

Specifications	HI839800
Temperature of Reaction	105°C or 150°C (221°F or 302°F)
Temperature Stability	±0.5°C (±0.9°F)
Temperature Range	-10°C to 160°C (14°F to 320°F)
Accuracy	±2°C (±3.6°F)
Capacity	25 vials (dia 16 x 100 mm), one receptacle for a stainless steel reference thermometer
Warm-up Time	10-15 minutes, depending on selected temperature
Operating Mode	timed (0 to 180 minutes) or infinity mode
Block	aluminum
Ordering Information	**HI839800-01** (115V) and **HI839800-02** (230V) is supplied with power cable and instructions.

Measuring turbidity - fining & protein stability in wine

At various stages during maturation, wine is treated with fining agents, since unrefined wine is quite turbid and hazy. The turbidity is due to suspended solids produced during fermentation. This cloudiness is what winemakers refer to as protein haze, or haze for short. Thaumatin-like proteins and chitinases are the primary grape proteins responsible for haze formation. These positively charged proteins degenerate and stick together, resulting in undesirable flocculent clouds and visible haziness.

Bentonite clay is commonly used as a fining agent in wine. Fining, or clarifying, is the process of removing substances that contribute to haze by binding them through adsorption. Bentonite is negatively charged and incorporated into the wine as a colloid (fine powder mixed with water). The negatively charged clay binds to the positively charged protein molecules. After treating the wine, the particulates settle out, transforming the beverage to a desired color and clarity. This process also makes the wine more stable, meaning the wine's signature taste, aroma and appearance won't change appreciably while in storage.

It is common to perform a protein stability test in addition to fining trials to understand if fining is required and how much bentonite would be appropriate for the addition. It is important to know exactly the amount of bentonite to add to your wine because if added in excess it may strip the stock of color and flavor.

Portable Turbidity and Bentonite Check Meter

The HI83749 is a portable turbidity meter for the monitoring of protein stability and bentonite in wine. The meter is supplied complete with bentocheck reagent and AMCO-AEPA-1 primary turbidity standards. The bentocheck reagent is used to determine the amount of bentonite required to increase protein stability and the AMCO-AEPA-1 primary turbidity standards are used for calibration and performance verification of the meter.

FastTracker™
location traceability

- Fast Tracker™ allows winemakers to record the time and location of a specific measurement or series of measurements using iButton™ tags on specific tanks for quick and easy readings. Each iButton® tag contains a computer chip with a unique identication code encased in stainless steel.

- AMCO AEPA-1 primary turbidity standards
  - These non-toxic standards are made of styrene divinylbenzene polymer spheres that are uniform in size and density. The standards are reusable and stable with a long shelf life.
- Calibration
  - A two, three, or four-point turbidity calibration can be performed by using the supplied (<0.1, 10, 100, and 500 NTU) standards.
- GLP data
  - The HI83749 features complete GLP (Good Laboratory Practice) functions that allow traceability of the calibration conditions. Data includes calibration points, date, and time.

- Data logging
  - Up to 200 measurements can be stored in the internal memory and recalled at any time.

- Backlit display
  - A backlit LCD display provides an easy to understand, user-friendly interface. Displayed codes guide the user step-by-step through routine operation and calibration.

Specifications	HI83749
Range	0.00 to 1200 NTU
Range Selection	automatic
Resolution	0.01 (0.00 to 9.99 NTU); 0.1 (10.0 to 99.9 NTU); 1 (100 to 1200 NTU)
Accuracy @25°C/77°F	±2% of reading plus 0.05 NTU
Repeatability	±1% of reading of 0.02 NTU, whichever is greater.
Method	ratio nephelometric method
Calibration	two, three or four points
Ordering Information	**HI83749-01** (115V) and **HI83749-02** (230V) are supplied with sample cuvettes and caps (6), calibration cuvettes (4), bentocheck reagent, silicone oil (HI98703-58), 1000 µL automatic pipette with two tips and instructions sheet, 25 mL glass vials with caps (4), 1 mL syringe with two tips, funnel, filter paper (25), cuvette cleaning cloth, 12 VDC adapter, batteries, instructions and rugged carrying case.
Reagents and Standards	**HI83749-11** Turbidity Calibration Set **HI83749-20** Bentocheck Solution

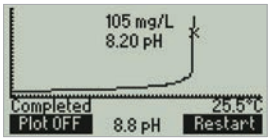
Yeast Assimilable Nitrogen (YAN) in winemaking

Yeast assimilable nitrogen (YAN), also known as Formol Number, is a measurement of nitrogen in wines. Nitrogenous compounds such as ammonia are essential to the winemaking process. A sufficient concentration of nitrogen must be present in the grape juice for healthy yeast metabolism and an efficient fermentation. Low nitrogen levels can result in slow or incomplete fermentations. When nitrogen availability is too low in wine must, yeast may undergo less efficient, undesirable fermentation pathways possibly yielding hydrogen sulfide, a compound known for its 'rotten egg' odor.

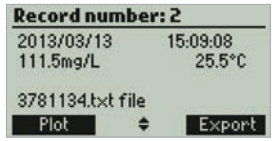
Typical nitrogen levels in grape must should be between 140-500 mg/L. Nitrogen can be supplemented with the use of diammonium phosphate (DAP), an Alcohol and Tobacco Tax and Trade Bureau (TTB) approved ammonium-based wine additive.

Mini Titrator for Measuring Formol Number in Wine and Fruit Juice

The HI84533 is a simple, fast, and affordable automatic mini titrator designed for testing formol number in wines or fruit juices. Based on an acid-base titration method, this mini titrator uses an optimized pre-programmed method of analysis with a powerful algorithm that determines the completion of the titration reaction by the use of a glass body pH electrode.



- Graphic mode
  - Displays in-depth data during titration, including a real-time graph of the titration curve.

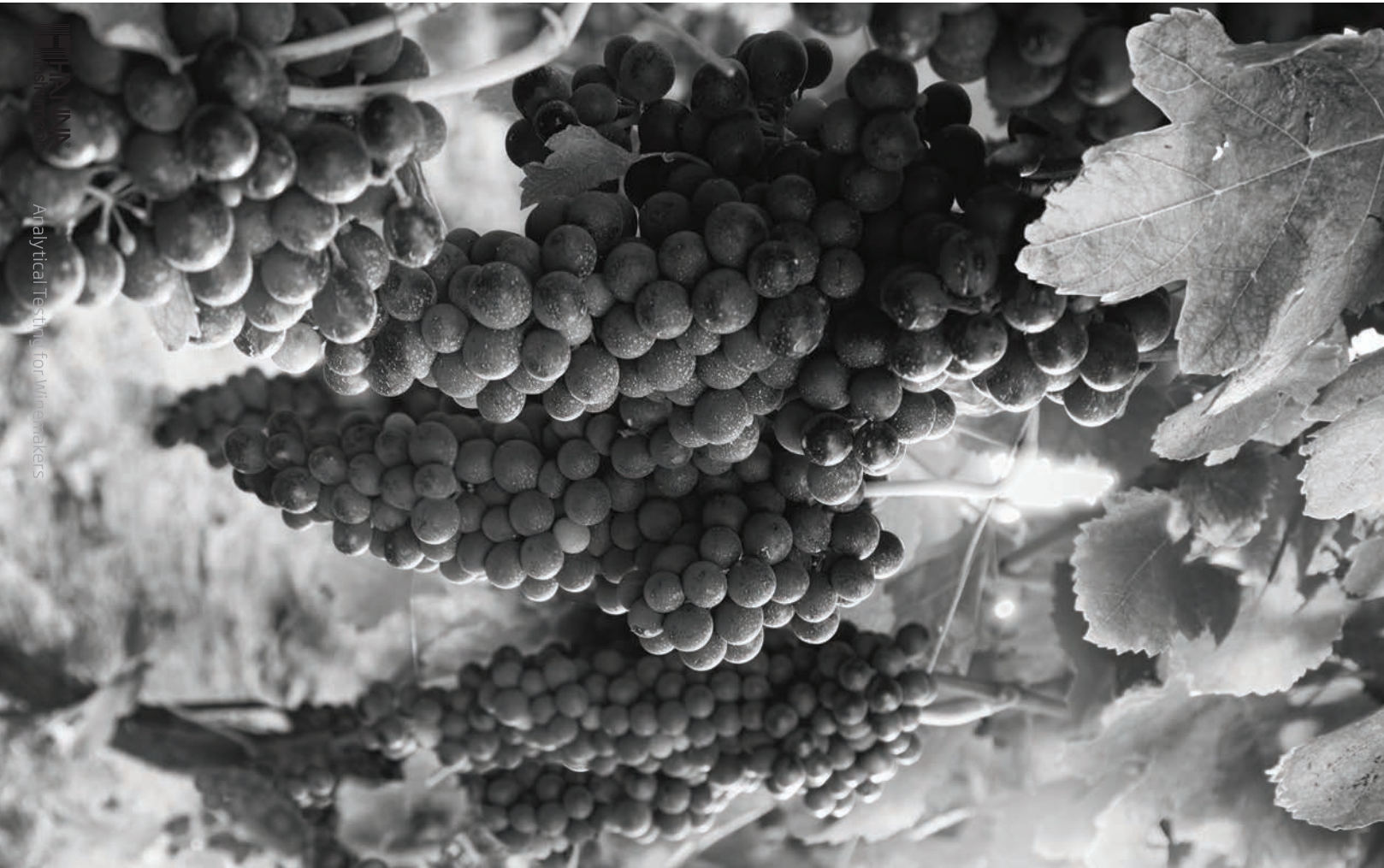


- Log-on-demand
  - The HI84533 allows for data logging of up to 400 samples: 200 titration results and 200 pH/mV readings. Data can be stored and exported to a USB drive or a PC using the USB connection.

B
BNC

HI84533 includes HI1131B glass bodied pH electrode with BNC connector.

Specifications		HI84533
Titrator	Range (as N)	Low Range: 2.14 to 28.57 meq/L; 0.21 to 2.85 meq%; 30.0 to 400.0 mg/L High Range: 21.7 to 71.4meq/L; 2.14 to 7.14 meq%; 300 to 1000 mg/L
	Resolution	Low Range: 0.01 meq/L; 0.01 meq%; 0.1 mg/L High Range: 0.1 meq/L; 0.01 meq%; 1 mg/L
	Accuracy (@25°C/77°F)	±0.1 mg/L or 3 % of reading, whichever is greater
	Sample Volume	Low Range: 10 mL; High Range: 5 mL
	Method	acid-base titration
	Principle	endpoint titration, adjustable (pH 8.0 - 8.5 in 0.1 increments)
	Pump Speed	10 mL/min
pH Meter	Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
	Resolution	0.1 pH / 0.01 pH
	Accuracy (@25°C/77°F)	±0.01 pH
	Calibration	one, two, or three-point calibration; 4 available buffers (4.01; 7.01; 8.20; 10.01)
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy	±0.4°C; ±0.8°F; ±0.4 K
Ordering Information	**HI84533-01** (115V) and **HI84533-02** (230V) are supplied with HI84533-70 reagent kit for formol number in wine and fruit juices, HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution (30 mL), 100 mL beakers (2), HI70500 tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), dosing pump valve, HI740236 syringe (5 mL), plastic pipette (1 mL), HI731319 stir bar, cleaning solution sachets for wine deposits and wine stains (2), power adapter, instruction manual and quality certificate.	
Reagents	**HI84533-50**	titrant solution, 230 mL
	HI84533-55	pump calibration standard, 120 mL
	HI84533-60	hydrogen peroxide reagent, 30 mL
	HI84533-61	formol base reagent, 230 mL
	HI84533-62	pH adjustment reagent, 30 mL



Measuring potassium in wine

In wine grapes, potassium plays an important role in determining the pH of juice and the stability of finished wine. As the potassium content in grapes increases, tartaric acid binds with potassium ions, forming potassium tartrate. Once saturated, potassium tartrate will precipitate, removing free acidity from juice. This results in a juice with decreased acidity and increased pH. Potassium uptake from the soil by the grapevine roots is accelerated in warm, dry climates. This causes the resulting grapes to typically have pH values above the ideal range of pH 3.0 to 3.8.

Wines and juice with pH values above pH 3.8 due to high potassium content may be adjusted by the addition of tartaric or malic acid. These adjustments will both lower the pH and raise the acidity, and are typically made in the juice before fermentation. Potassium can also naturally be lowered in grapes by limiting the availability of potassium to the vines or utilizing a blend of wine grapes to ensure an ideal balance of potassium, pH, and acidity.

Winemakers with a robust laboratory setting may use ion selective electrodes (ISEs) to understand the potassium concentration of their juice, must, or wine.

Potassium Half-Cell ISE

Specifications	HI4014
Type	polymer membrane; half-cell
Measurement Range	1.0M to $1 \cdot 10^{-6}$M 39100 to 0.039 mg/L (ppm)
Optimum pH Range	1.5 to 12.0
Temperature Range	0 to 40°C
Approximate Slope	+56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	epoxy/PVC
Ordering Information	**HI4014** half-cell ISE with 1 m coaxial cable and BNC connector

Potassium Combination ISE

Specifications	HI4114
Type	polymer membrane; combination
Measurement Range	1.0M to $1 \cdot 10^{-6}$M 39100 to 0.039 mg/L (ppm)
Optimum pH Range	1.5 to 12.0
Temperature Range	0 to 40°C
Approximate Slope	+56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI/PVC
Ordering Information	**HI4114** combination ISE with 1 m coaxial cable and BNC connector

Reference ISE

Used to complete electrical circuit and to provide stable reference voltage for ISE half-cells.

Specifications	HI5315
Type	N/A
Measurement Range	N/A
Optimum pH Range	N/A
Temperature Range	0 to 85°C
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI
Ordering Information	**HI513** reference ISE with 1 m coaxial cable and BNC connector

ISE standards

Hanna ISE Standards are made and bottled in our own state-of-the-art solutions facility. ISE Standards are required for direct and incremental measurement techniques and are available with certificate of analysis.

Code	Description
HI4014-01	0.1 M potassium standard, 500 mL

Ionic Strength Adjusters (ISA)

Hanna Ionic Strength Adjusters (ISA) are formulated to provide a constant ionic strength in sample and standards alike, thus permitting concentration rather than activity measurements to be made. In some cases ISAs adjust pH and eliminate matrix effects.

Code	Description
HI4014-00	ISA for potassium ISEs, 500 mL

Accessories

Code	Description
HI4014-51	potassium module for HI 4014 half-cell ISE
HI4114-51	potassium module for combination ISE

Measuring ammonia in wine

Before fermentation, total nitrogen (present in the form of ammonia and amino acids) is commonly measured in must to ensure an adequate concentration of yeast available nitrogen (YAN) for efficient fermentation. Any ammonia not consumed by the yeast during fermentation remains in the finished wine. Ammonia in wine can impact flavor and microbial stability in the final product. Typical concentrations for ammonia in finished wine range between 3-50 mg/L.

Ammonia in wine is commonly measured with an ion-selective electrode (ISE). First, an ionic strength adjuster (ISA) is added to the wine. The ISA fixes the sample so that ion concentration, not just activity, can be measured. Additionally, the ammonia ISA is a base that adjusts the sample pH above 11 to ensure that all of the ammonium (NH_4^+) present in the wine sample is converted to gaseous ammonia (NH_3). Ammonia ISEs use a gas permeable membrane, which selectively permits the passage of ammonia gas across. As ammonia diffuses across the membrane, it changes the pH of an internal electrolyte. A pH electrode housed inside the body of the ammonia ISE detects the pH change. The change in pH is directly proportional to the ammonia concentration.

Ammonia Combination ISE

Parameter	HI4101
Type	gas-sensing; combination
Measurement Range	1M to $1 \cdot 10^{-6}$M 17000 to 0.02 mg/L (ppm) 14000 to 0.016 mg/L as N
Optimum pH Range	>11
Temperature Range	0 to 40°C
Approximate Slope	-56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	Delrin®
Ordering Information	**HI4101** gas-sensing, combination ISE with 1 m coaxial cable and BNC connector

ISE standards

Code	Description
HI4001-01	0.1 M ammonia standard, 500 mL
HI4001-02	100 mg/L (ppm) ammonia standard (as NH_3^-N), 500 mL
HI4001-03	1000 mg/L (ppm) ammonia standard (as NH_3^-N), 500 mL

Ionic Strength Adjusters (ISA)

Code	Description
HI4001-00	alkaline ISA for ammonia and cyanide ISEs, 500 mL

Gas sensor fill solutions

Code	Description
HI4001-40	ammonia filling solution, 30 mL (4)

Specific solutions for ISE sensors

Code	Description
HI4000-47	pH 4 and pH 7 buffers with chloride ions background, used to check internal glass electrode of gas sensors, 10 packages each and 2 beakers
HI4001-45	conditioning and storage solution for HI4101 ammonia ISE, 500 mL

Accessories

Code	Description
HI4000-51	gas sensor replacement pH for ammonia sensor
HI4000-52	gas sensor membrane cap for ammonia
HI4001-51	ammonia membrane kit (20 loose)

Temperature in winemaking

During fermentation the temperature is monitored for multiple reasons. From a biological standpoint the yeast become sluggish at very cold temperatures and can be killed at higher temperatures. From sensory standpoint, high temperatures in the fermentation process can lead to the production of hydrogen sulfide (rotten egg smell) by certain strains of yeast and can produce a "cooked" flavor in the finished product.

Large producers of wine will use a cooling system to remove the heat produced by the fermentation process. These cooling systems include a jacketed fermentation tanks that are cooled by glycol or ammonia.

There is much debate about the ideal fermentation temperatures. According to Wyeast, a yeast manufacturer, white wines are fermented at colder temperatures (45-60°F/7-15°C) and red wines are fermented at warmer temperatures (70-85°F/20-30°C). It is found that at colder temperature preserve fruity aromatic compounds that are characteristic in white wines while higher temperatures provide for better tannin and color extraction, which are good for red wines.

Temperature is also important in the conditioning and storage of wine prior to bottling. Red wines are conditioned at 68°F/20°C while white wines at 60°F/15°C.

Checktemp® Digital Thermometer

The HI98501 Checktemp® is a digital thermometer with stainless steel penetration probe. It delivers high accuracy temperature measurements over a wide temperature range without worrying about breakage or condensation.

- ±0.2°C (±0.5°F) - Accuracy
- CAL Check™ - automatically verifies calibration at startup
- °C/°F Status - User selectable
- Large display with wide environmental temperature range and viewing angle.
- IP 65 water resistant protection
- HACCP Compatible - Use as a tool for control in HACCP analysis
- AISI 316 stainless steel penetration Probe
- 2000 hours of battery life (Continuous use)
- Auto-Off (select from 8 min., 60 min., or turn the feature off)

Specifications	°C	°F
Range	-50.0 to 150.0°C	-58.0 to 302°F
Resolution	0.1°C (-50.0 to 150.0°C)	0.1°F (-58.0 to 199.9°F); 1°F (above 200°F)
Accuracy	±0.2°C (-30 to 120°C) ±0.3°C (outside: -50.0 to -30.0°C and 120.0 to 150.0°C)	±0.5°F (-22 to 199.9°F) ±1°F (outside: -58.0 to -22.0°F and 200 to 302°F)
Ordering Information	**HI98501** (Checktemp®) is supplied with penetration probe, protective cap, CR2032 Li-ion battery and instructions.	

Checktemp® Dip Digital Thermometer

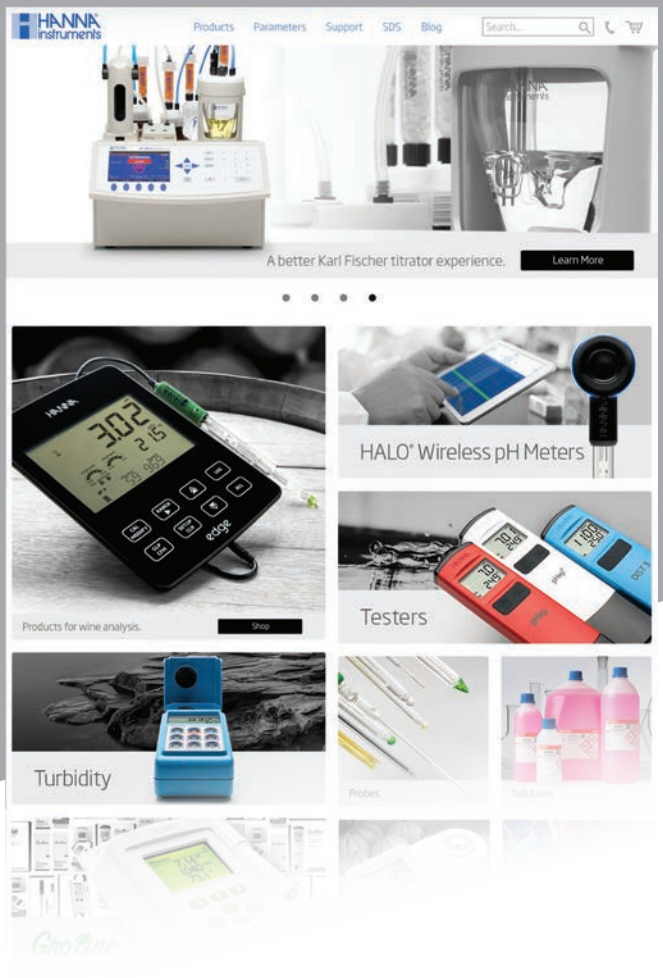
The Checktemp Dip Digital Thermometer - HI98539 is a high-accuracy thermometer connected to a weighted, stainless steel probe by a 3 m (9.9') flexible, silicone cable. The probe incorporates an NTC thermistor sensor, providing an extremely accurate temperature measurement that can satisfy your HACCP requirements.

- ±0.3°C (±0.5°F) Accuracy
- CAL Check™ - automatically verifies calibration at startup
- 3 m (9.9') silicone cable
- °C/°F readout – User selectable
- Clear LCD display that is easy to read
- IP 65 water resistant protection
- HACCP Compatible - Use as a tool for control in HACCP analysis
- AISI 316 stainless steel weighted probe
- User-selectable auto-off (select from 8 min., 60 min., or disable)

Specifications	°C	°F
Range	-20.0 to 80.0°C	-4.0 to 176.0°F
Resolution	0.1°C	0.1°F
Accuracy	±0.3°C	±0.5°F
Ordering Information	**HI98539** (Checktemp®Dip) is supplied with stainless steel weighted probe, stand, 1.5V AAA batteries (3) and instructions.	

Quick access to our entire product line.

Visit **hannainst.com**. There you can search for products, look up local office contacts, consult our knowledgebase, and download instruction manuals, MSDS, and brochures.



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