



Titration Catalog

Systems and Autosampler



 **HANNA**[®]
instruments

Hanna Instruments® Titration Systems

Titration is used in analytical chemistry to determine the amount or concentration of a substance, known as the analyte. Titration is a quantitative measurement of an analyte in solution by its complete reaction with a reagent. In a titration, one reagent (the titrant) is slowly added to a solution containing the species being measured (the analyte). As it is added, a chemical reaction occurs between the titrant and analyte. The point at which the reaction is complete and an equivalent quantity of titrant and analyte are present (a stoichiometric equivalent) is called the equivalence point. This can be determined by a chemical indicator that is also present in the solution, or by a measurable physical change in the solution, like pH, electrode potential, conductivity, or light absorption (color). In practice, an abrupt change of this physical property signals the end of titration, called the endpoint.

The purpose of titration is to determine the quantity or concentration of an analyte with a known concentration and volume of a titrant. Titrations are based on chemical reactions which must fulfill four requirements:

- The reaction between the analyte and the titrant must occur quickly, without a secondary reaction
- The reaction must go to completion
- The reaction must have well-known stoichiometry (reaction ratio)
- Must have a convenient method of endpoint detection

Titrations are highly precise and can provide many advantages over alternative methods. Titrations are quickly performed and require relatively simple apparatus and instrumentation.

Automatic Titration

Automatic titration is done with instrumentation that delivers the titrant, stops at the endpoint and calculates the concentration of the analyte automatically. Automatic titrators are best for accurate and repeatable results, as an electrochemical measurement is used to determine the endpoint as opposed to a subjective color indicator.

Analyses that can be performed by potentiometric automatic titrators include...

- Acid-base titrations
- Oxidation reduction titrations
- Complexometric titrations
- Precipitation titrations
- Non-aqueous titrations
- Argentometric titrations
- pH, ORP and Ion selective measurements

Analyses performed by bivolammetric automatic titrators include...

- Coulometric Karl Fischer titration (trace amounts of water determination)
- Volumetric Karl Fischer titration (greater than 100 ppm water determination)



The required equipment for automatic titration include an automatic titrator equipped with a burette, a standardized titrant, a volumetric pipette (to measure the sample volume) or analytical balance (to measure or weigh a sample), a beaker, a sensor, and a stirring mechanism.

The automatic titrator must have an accurate liquid-dispensing system. In high accuracy systems, this is typically a motor-driven piston burette, a valve system to switch between titrant inlet and outlet, and a titration tip to dispense the titrant into the sample solution. These three main subsystems must be as accurate as possible, with very low gear backlash in the burette drive mechanism, low piston seal flexing, accurate burette glass cylinder diameter, low dead volume in the valve, minimal evaporation/permeation and chemically resistant tubing.

Standards and Standardization

One of the substances involved in a titration must be used as a standard for which the amount of substance present is accurately known. The standard can be present either in the form of a pure substance or as a solution. The titrant solution can be standardized in two ways; using a primary standard, or more commonly, titrating it against a previously standardized solution.



HI902C Automatic Titration System



- Linear and dynamic dosing
- USB port allows for the transfer of methods and reports to a PC or another titrator via USB flash drive
- One or two sensor input models
- RS232 port for connection to an analytical laboratory balance
- VGA port for external monitor
- Multi-language support

Four working modes:

- **Potentiometric titrator**
 - Choice of endpoint detection: equivalence point (1st or 2nd derivative) or fixed pH/mV value
 - Clip-Lock™ exchangeable burette system enables users to exchange burettes in a matter of seconds
 - Linked titration methods allow two methods to run in sequence
 - Acid-base, non-aqueous, redox, complexometric, precipitation, non-aqueous and argentometric titrations can be performed
 - Supports up to 100 titration methods (standard and user-defined)
 - Supplied with a standard methods pack or customizable user methods
- Titration graph can be displayed on-screen and saved as a bitmap
- Reminders for titrant age and standardization expiration
- Multiple equivalence endpoint titrations with multiple molecular weights and reaction ratios
- Supports two burette dosing pumps with the ability to perform back titrations
- 5, 10, or 25 mL precision ground glass syringe with PTFE plunger
- 40,000 step screw drive, piston dosing pump
- 3-way motor driven valve
- PTFE burette tubing with polyurethane tube jacketing
- **Full featured research grade pH meter**
 - Automatic Temperature Compensation (ATC)
 - Up to five calibration points with automatic recognition of standard buffers and up to five custom buffers
- **mV (ORP) meter**
 - Relative mV calibration
- **ISE meter**
 - Numerous concentration units including: mol/L, mmol/L, mg/L, µg/L, %, ppt, ppm, g/L and user-defined
 - Up to five calibration points with five custom standards



- Support for 2 electrodes, 2 burette dosing pumps and 2 stirrers



- Clip-Lock™ Exchangeable Burette System
 - With Clip-Lock™, it only takes a few seconds to exchange the reagent burettes to perform a different titration. No need to purge, clean and refill



- Method sequencing
 - Linked titration methods allow two methods to run in sequence



- Easy upgrades
 - Field upgradable software via USB
 - Convenient for saving data

Powerful Customization, Accurate Analysis

The HI902C is an automatic titrator that complements our wide range of products dedicated to quick and accurate laboratory analysis. HI902C can perform acid-base, redox, complexometric, precipitation, non-aqueous and argentometric titrations.

The HI902C dispenses the titrant, detects the endpoint and performs all necessary calculations automatically.

This versatile titrator supports up to 100 standard or user-defined methods. When powered on, the instrument initiates an internal diagnostics check and then readies itself for the first titration of the day. A large color LCD screen clearly shows the chosen method and related information. A real-time titration curve can be shown on the display; this feature is useful when new methods are tested or when a procedure needs to be optimized. At the end of the titration, the data is automatically stored and can be transferred to a flash drive or PC by USB connection.

This titrator is supplied with a pack of standard methods or you can create your own. Methods (standard or user) can be transferred between titrators

using a USB flash drive. Software updates can also be performed using a USB flash drive as well.

Users can connect pH, ORP or ISE electrodes to the HI902C, as well as create a complete workstation with a PC, monitor, keyboard and printer.

The HI902C complies with GLP requirements. All GLP information from each sample can be stored, including ID number, date and time of analysis, electrode ID code, and last calibration date.

Clip-Lock™ Exchangeable Burette System

With Clip-Lock™, it only takes a few seconds to exchange the reagent burettes to perform a different titration.

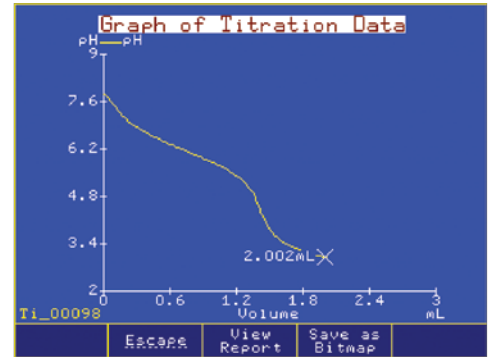
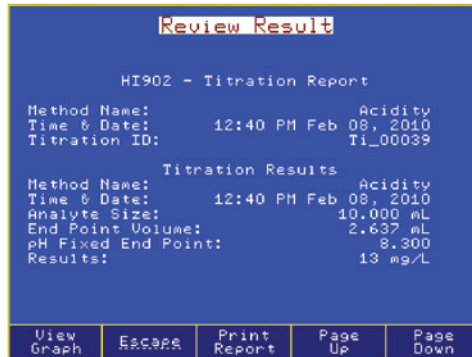
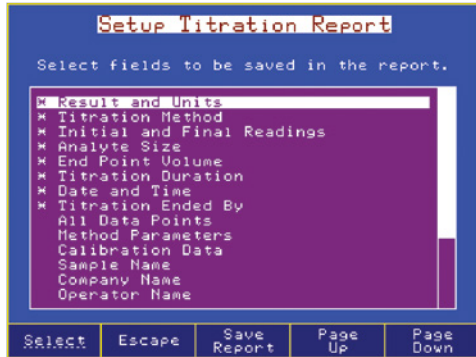
The Clip-Lock™ exchangeable burette system prevents cross contamination while reducing loss of time and reagents. Simply slide out the burettes and detach the dispensing tubes from the overhead assembly for quick exchange.

Having several prepared burettes on hand will make the Hanna HI902C one of the fastest and most versatile titration systems on the market.

Versatile Data Management

- HI902C titration system can be easily incorporated into any existing GLP data management program:
 - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information

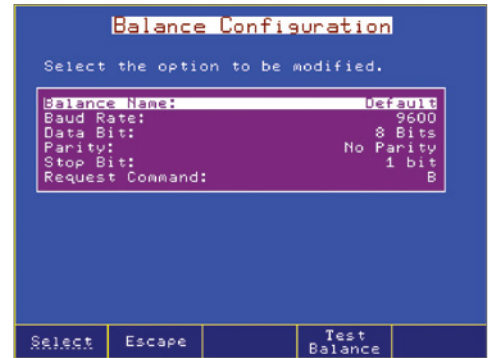
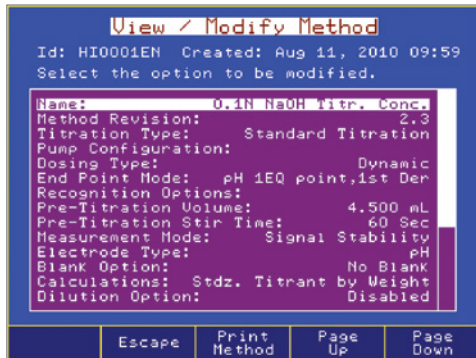
- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



- Customizable reports
 - Data to be stored in titration reports is fully customizable

- Titration reports
 - Titration or pH/mV/ISE results can be viewed on-screen or transferred to a USB flash drive or PC

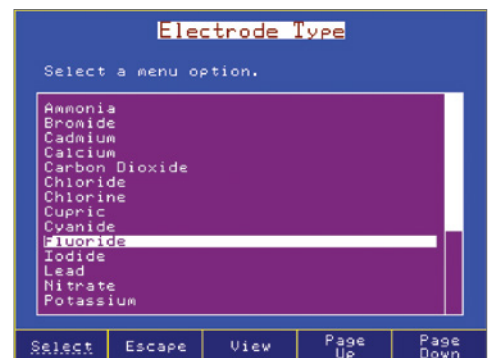
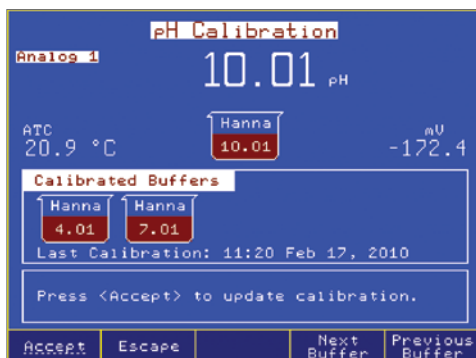
- Titration graphs
 - Titration graphs can be viewed on-screen or saved as images and transferred along with titration report



- Fully customizable titration methods

- Linked methods allow two methods to run in sequence

- Fully configurable balance interface



- Up to five-point pH calibration with automatic buffer recognition

- Relative mV calibration allows for a mV offset

- Selectable ISE's preprogrammed with MW and ion charge

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
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 mV
ISE	Range	1•10 ⁻⁶ to 9.99•10 ¹⁰
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	±0.5% monovalent; ±1% divalent
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
Other Specifications	Burette Sizes	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
	Languages	English, Portuguese, Spanish
	Methods	load up to 100 methods (standard and user-defined)
	Burette Auto-Detection	burette size is automatically recognized when inserted into the unit
	Programmable Stirrer	overhead propeller type, 100-2500 RPM, resolution 100 rpm
	Flow Rate	user-selectable from 0.1 mL/min to 2 x burette volume/min
	Temperature Compensation	manual (MTC) or automatic (ATC)
	Endpoint Determination	equivalence point (1st or 2nd derivative) or fixed pH/mV value
	pH Calibration	up to five-point calibration, eight standard buffers and five custom buffers
	mV Calibration	single point offset
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
	Potentiometric Titrations	acid-base, redox, precipitation, complexometric, non-aqueous, argentometric
	Measurement Units	user-specified expression of concentration units to suit specific calculation requirements
	Real Time & Stored Graphs	mV-volume or pH-volume titration curve, 1st derivative curve or 2nd derivative curve pH mode, mV mode or ISE mode: pH/mV/concentration versus time
	Data Storage	up to 100 titration and pH/mV/ISE reports
	USB Host (Side)	flash drive compatibility for transfers of methods and reports
	Peripherals (Rear)	connections for VGA display, PC-keyboard, parallel printer, USB device input, RS232, interface for autosampler
	GLP Conformity	instrumentation data storage and printing capabilities
	Operating Environment	10 to 40°C (50 to 104°F), up to 95% RH
	Storage Environment	-20 to 70°C (-4 to 158°F), up to 95% RH
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9 in)
	Weight	approximately 9 kg (20 lbs.) with one pump, stirrer and sensors
Ordering Information	<p>HI902C1-01 and HI902C1-02: titrator with one analog board, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump drive, temperature sensor, USB cable, 256 Mb USB flash drive and PC software.</p> <p>HI902C2-01 and HI902C2-02: titrator with two analog boards, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, 256 Mb USB flash drive and PC software.</p>	

HI921 Autosampler



control panel

- Flexible, accurate detection of the titration endpoint with HI902C potentiometric titrator
- Automation of up to 18 samples per tray
 - 16 sample tray holds 150 mL beakers
 - 18 sample tray holds 100 mL beakers
- Absolute encoder in sample tray
 - The Autosampler always knows the tray position without the need to "home" or calibrate.
- Electrode rinse feature
 - Up to 3 beakers per tray can be designated for electrode dip/spray rinses
- Automatic addition of reagents or deionized water to the sample beaker by peristaltic pump
- Included control panel for manual operation of motors and pumps
- Built-in magnetic stirrer or optional overhead propeller stirrer
- Barcode reader interface for easy sample tracking
- Built-in RFID in each tray, communicating tray serial number and type
- Optical IR beam detects presence or absence of beakers in the tray
 - Ensures the Autosampler does not proceed with titration if a beaker is missing
- Field upgradable software
- Sample trays made of chemically-resistant materials are removable, easy to clean and dishwasher safe.
- Electrode holder can accommodate 3 x 12 mm electrodes, temperature sensor, 1 aspiration tube and 5 multipurpose tubes (reagent addition, burette dosing)
- Real-time progress of the sequence and results shown on the HI902 titrator screen
- Optional integrated peristaltic (up to 3) or membrane pumps
- Sample leveling feature
 - Automatic leveling for fast preparation of volumetric samples
- Waste removal feature
 - Aspirate completed samples into a waste container

Automate up to 18 samples

The HI921 Autosampler is an automated titration sample handling system designed for use with the HI902C Potentiometric Titration System. This high quality system makes the titration of multiple samples quick and easy.

The HI921 can utilize up to three peristaltic pumps for automatic reagent addition, sample leveling and waste aspiration and one membrane pump for spray rinsing. An included control panel allows for manual operation of the motors and pumps. The HI921 also features a built-in magnetic stirrer, electrode rinse feature, USB interface with compatible barcode reader and built-in RFID for each tray.

With the Autosampler, up to 18 samples can be run consecutively. The HI921 Autosampler interfaces directly with the HI902C to access titration methods. Once a method is established, the user can then customize the automation sequence for their samples. Sample names and size can be customized or auto-filled with preset values. Once the Autosampler sequence is complete, two reports are available for review: a sequence report with a table outlining each sample name, beaker position, sample size and result for the tray, and a detailed titration report for each individual sample, including the graph of the titration data.





Peristaltic and Membrane Pumps

- Up to three peristaltic pumps can be added at anytime
- User replaceable pump systems
- Peristaltic pumps
 - Uses high performance plastic that is engineered to be chemically resistant and have long service life.
 - Reagent addition, sample leveling, waste removal
 - Greater than 200 mL/min flow
- Membrane pumps
 - Simple plug connection for tubing
 - Greater than 400 mL/min flow

The Autosampler comes with multiple configurations for pumps, including up to three peristaltic pumps and a single membrane pump. The pump system has a simple install process and can be connected without the need of a technical repair person. The membrane pump system has a simple plug-in setup with clearly defined inputs for the tubing.

Status indicator lights

Status lights are located on both sides of the autosampler. These can be seen from far away and also correspond to the status indicator on the HI902C LCD. These lights double as a safety feature, as pressing them at any time will automatically stop any titration process.



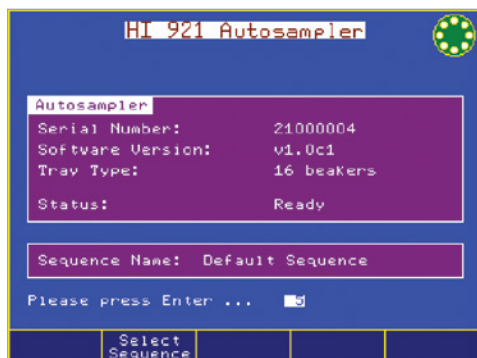
- Steady green
 - Idle, ready to start
- Flashing green
 - Titration sequence running



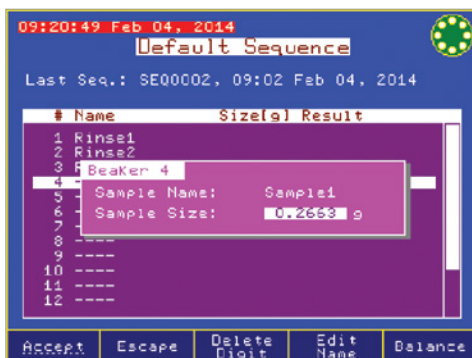
- Flashing yellow
 - Titration sequence paused



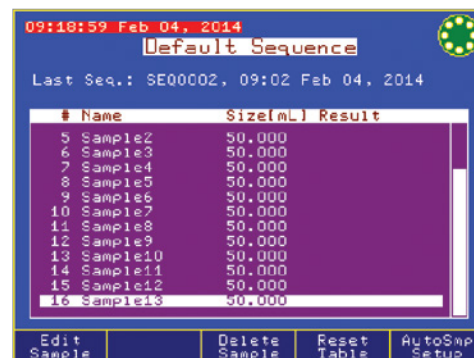
- Steady Red
 - Error or emergency stopped, or initializing during power on
- Flashing Red
 - Error during sequence running or manual operation



- RFID recognition
 - Sample trays are automatically detected and identified when placed on the Autosampler.



- Digital balance compatibility
 - Sample weights are communicated when connected to a digital balance.



- Speedy sample entry
 - Sample names can be automatically incremented for speedy sample identification.



Specifications

HI921

Electrode Holder Slots	3 x 12-mm electrodes	Trays	16 beakers x 150 mL (HI920-11660)
	1 temperature sensor		18 beakers x 100 mL (HI920-11853)
	1 aspiration tube		built-in RFID, transmits the tray type and serial number to Autosampler
	5 multi - purpose slots (titrant/reagent tubes)		ASTM short-form glass beakers
	1 overhead stirrer		HI920-060 (150 mL), fits HI920-11660 tray - 16 plastic beakers
Temperature Sensor	HI7662-A (included)	Beakers	HI920-053 (100 mL), fits HI920-11853 tray - 18 plastic beakers
Stirrers	built-in magnetic stirrer		Control Panel
	overhead propeller stirrer (optional)	manual operation of peristaltic or membrane pumps	
Peristaltic Pumps	up to 3 can be installed	Barcode Reader	
	installs in slots #1, 2, 3		compatible with USB barcode readers, used to add sample names
Membrane Pump (for cleaning)	installs in slot #4	Report Storage	up to 40 trays of samples (e.g.: 720 reports for 18-beaker tray)

Ordering Information

Choose your Autosampler configuration:

x=	1	16 sample tray
	2	18 sample tray
y=	0	no peristaltic pump
	1	one peristaltic pump
	2	two peristaltic pumps
z=	0	no membrane pump
	1	one membrane pump

HI921 – x y z

HI903 Karl Fischer Volumetric Titrator

for Moisture Determination



Measures 100 ppm to 100% water content

- **Precision titrant delivery system**
 - 40,000 step piston dosing pump
 - Accurate to 0.1%
 - Delivers as little as 0.125 μL of titrant
 - Precision ground, 5 mL glass burette with PTFE plunger, PTFE burette tubing, and polyurethane tube jacketing (thermally insulating, light blocking)
 - Glass anti-diffusion dispensing tip
 - Clip-Lock™ exchangeable burette system enables users to exchange titrant burettes in a matter of seconds
- **Sealed solvent system**
 - Change to fresh solvent in a matter of seconds without opening the titration vessel
 - Minimizes exposure to ambient humidity which reduces titrant consumption and saves time
 - PTFE solvent tubing is resistant to harsh KF solvents and titrants
- **Beaker top**
 - Chemically-resistant reaction vessel cap and fittings
 - Quick-remove sample port plug with replaceable silicone rubber septum for sample introduction
- **Anti-diffusion burette tip**
 - Delivers titrant in high turbulence zone, ensuring rapid reaction
 - Prevents unwanted diffusion of titrant into solvent
- **Built-in stirrer**
 - Automatic, integrated magnetic stirrer adjustable from 200-2000 RPM
 - Optical feedback for automatic speed control
- **Rechargeable indicating desiccant**
 - Prevents the ingress of ambient humidity into the sealed solvent system while maintaining full titrator functionality
 - Minimizes changes to titrant titre
 - Indicates when adsorption capacity is depleted
 - Regenerated at 150°C
- **PTFE bottle cap**
 - Caps fit any GL45-threaded bottle
 - Chemically-resistant caps and fittings
 - Removable desiccant cartridges



Adaptable, High Accuracy Moisture Determination

The HI903 Karl Fischer Volumetric Titrator for moisture analysis is an extension of Hanna's highly successful potentiometric titrator platform. The HI903 combines an ultra-high precision titrant delivery system with optically-regulated magnetic stirring, sophisticated endpoint determination, dynamic dosing and background drift correction algorithms.

The result is an extremely adaptable titrator capable of titrating with superior accuracy and precision, even for samples with low moisture content. The HI903 dispenses the titrant, detects the endpoint and performs all necessary calculations automatically.

The HI903 comes equipped with a solvent-handling system to reduce cell conditioning time and can be connected directly to a laboratory analytical balance via RS232 serial interface.

The HI903's powerful software and intuitive menus are easily navigated on the large, color LCD display, making it simple to view results. Choose from included methods or develop a custom method for almost any application or sample type. Methods (standard or user) and reports can be transferred between titrator and PC via USB interface by using the Hanna PC software. Software updates can be performed using a USB flash drive.



Anti-Diffusion Tip



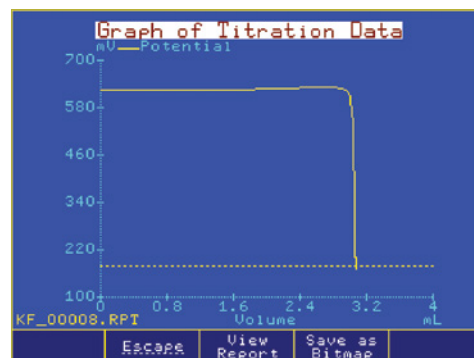
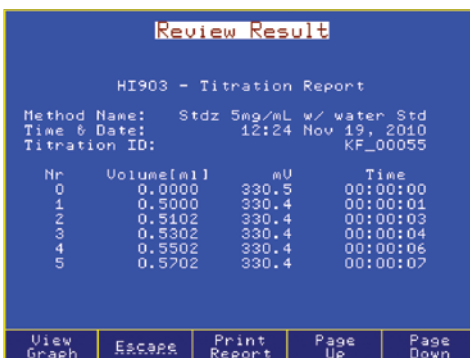
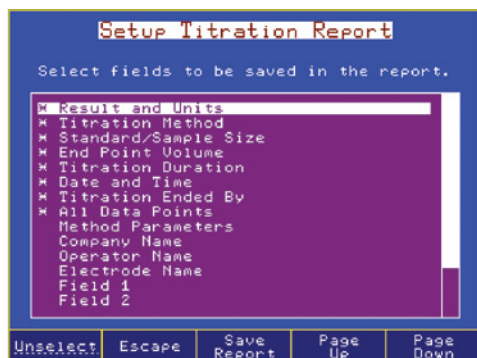
The HI903 features a glass, anti-diffusion burette tip. The chemically inert glass tip doses titrant in an upward approach to facilitate a fast reaction with the sample. In a Karl Fischer reaction, the titrant is more dense than the solvent. To eliminate the potential of diffusion, the partial-siphon design ensures the titrant remains in the tip instead of slowly draining into the titration cell. Assembled to remain in a fixed position, the anti-diffusion tip is positioned to certify thorough mixing of titrant and solvent before reaching the sensing electrode.

- **Titrant database**
 - Stores standardization information for up to 20 titrants
 - Standardization reminders
- **Supports up to 100 titration methods (standard and user defined)**
- **Dynamic dosing with optional pre-dispensing**
 - For faster titration without sacrificing accuracy
- **Results displayed directly in the selected units**
- **Titration graph can be displayed on-screen and saved as a bitmap**
- **Multi-language support**
- **USB flash drive input**
 - Transfer methods, reports and graphs to a PC or other HI903 titration system
 - Field upgradable software
- **Incorporates into any GLP data management program:**
 - Easily record all necessary GLP information with every sample, including company and operator name, date, time, electrode ID codes and standardization information
- **Compatible with most major brands of Karl Fischer reagents**
- **Proper mixing of titrant and analyte**
 - Digital, magnetic stirring system with optical feedback
 - Conical titration cell to facilitate mixing over a wide volume range
 - Upward dispensing of titrant to ensure rapid reaction
- **Flexible, accurate detection of the titration endpoint**
 - Dual platinum pin electrode for bivalentammetric indication
 - Signal averaging reduces noise
 - Selectable endpoint criteria: fixed mV persistence, relative drift stop or absolute drift stop
- **Balance interface**
 - Automatically acquire sample mass via serial RS232 interface
- **Easy to operate**
 - User friendly interface
 - Context-sensitive help screens
 - Self-diagnostic features for external components including dosing pump, burette and stirrer
- **Ideal for applications such as food and beverage, pharmaceuticals, nutraceuticals, cosmetics and chemical and petrochemical manufacturing**

Versatile Data Management

- HI900 Series titration systems can be easily incorporated into any existing GLP data management program.
 - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information

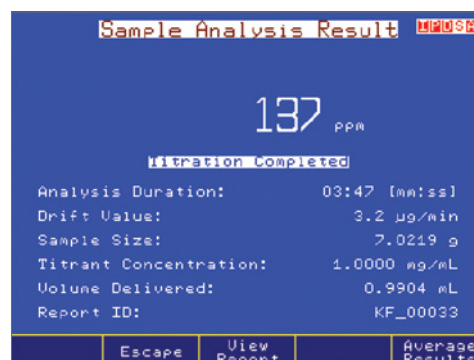
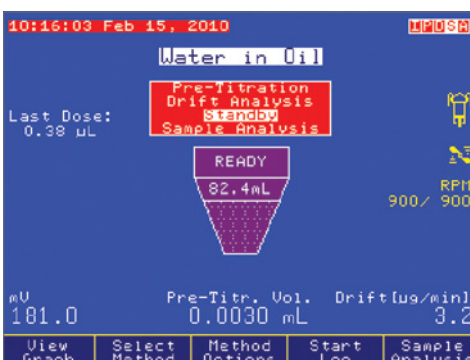
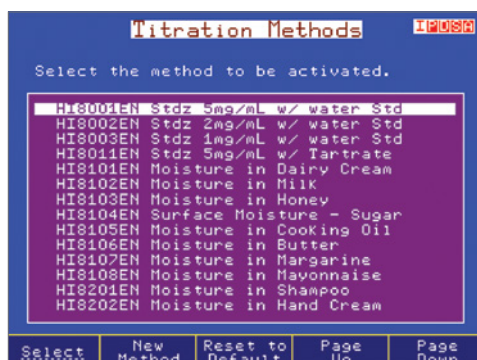
- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



- Customizable reports
 - Titration reports are fully customizable

- Titration reports
 - Titration results can be viewed on-screen or transferred to a USB storage device

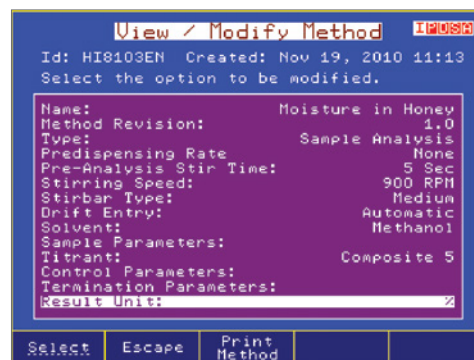
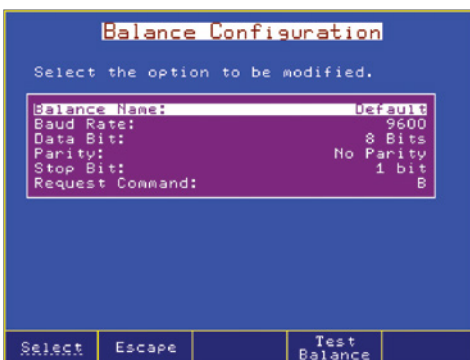
- Titration graphs
 - Titration graphs can be viewed on-screen or saved as images and transferred along with titration report



- Methods
 - The HI903 comes with a standard method pack

- Standby
 - The HI903 keeps the solvent dry between samples and corrects for water entering the cell (drift rate)

- Results
 - Titration results are displayed with links to average results or a user-customized report



- Titrant database
 - The HI903 stores standardization information for up to 20 titrants and displays a reminder when standardization is due

- Fully configurable balance interface
 - Enter sample size automatically from any laboratory analytical balance with RS232 serial output

- Fully customizable titration methods
 - Customize methods for any application

Specifications

HI903

Titration	Range	100 ppm to 100%
	Resolution	1 ppm to 0.0001%
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg/pc, µg/pc
	Sample Type	liquid or solid
Determination	Pre-Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop or absolute drift stop
	Dosing	dynamic with optional pre-dispensing rate
	Result Statistic	mean, standard deviation
Clip Lock™ Exchangeable Burette System	Dosing Pump Resolution	1/40000 of the burette volume (0.125 µL per dose) with 5 mL burette
	Dosing Pump Accuracy	±0.1% of full burette volume
	Syringe	5 mL precision ground glass with PTFE plunger
	Valve	motor-driven 3-way, PTFE liquid contact material
	Tubing	PTFE with light block and thermal jacketing
	Dispensing Tip	glass, fixed position, anti-diffusing
	Titration Vessel	conical with operation volume between 50-150 mL
	Solvent Handling System	sealed system, integrated diaphragm air pump
Electrode	Type	HI76320 dual platinum pin, polarization electrode
	Connection	BNC
	Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
	Voltage Range	2 mV to 1000 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 %
Stirrer	Type	magnetic, optically regulated, digital stirrer
	Speed	200-2000 rpm
	Resolution	100 rpm
Peripheral Devices	PC	easily view, transfer, print or delete methods and reports via HI900PC application
	USB Flash Drive	easily upgrade software or transfer methods and reports between devices using a USB drive
	Laboratory Analytical Balance	RS232 to connect any laboratory balance
	Printer	print directly from the HI903 to a printer via parallel port
	Monitor	instrument status and titrations can be viewed on a larger screen using any VGA-compatible external monitor
	Keyboard	alphanumeric text can be entered using an optional PS/2 keyboard
Additional Specifications	Graphic Display	5.7" (320 x 240 pixel) color LCD
	Titration Methods	up to 100 (standard and user) methods
	Data Storage	up to 100 complete titration reports and drift rate reports can be stored
	GLP Conformity	Good Laboratory Practice and instrument data storage and printing
	Languages	English, Portuguese, Spanish, and French
	Enclosure Material	ABS plastic and steel
	Keypad	polycarbonate
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Operating Environment	10 to 40°C, up to 95% RH
	Storage Environment	-20 to 70°C, up to 95% RH
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9")
Weight	approximately 10 kg (22 lbs.)	
Ordering Information	<p>HI903-01 and HI903-02 are supplied with HI76320 dual platinum pin electrode, dosing pump, 5 mL burette assembly with tubing, air pump assembly with tubing, beaker and bottle top assemblies and all fittings, desiccant cartridges (4) with indicating desiccant, stir bar, waste bottle, calibration key, USB cable, power cable, HI900PC application, USB flash drive, quality certificate, ISO 8655 burette compliance report and instruction manual binder.</p>	

HI904

Karl Fischer Coulometric Titrator



Measures 1 ppm to 5% water content

- Precision dosing system by generator electrode
 - 400 mA pulsed current
 - Available with or without a diaphragm
- Molecular sieve desiccant
 - Prevents the ingress of ambient humidity into the sealed solvent system while maintaining full titrator functionality
 - Regenerated at 300°C
- Sealed cell
 - Generator electrode
 - Dual pin bivoltammetric platinum sensing electrode
 - Molecular sieve desiccant cartridge
 - Replaceable septum for liquid sampling port
 - Accessory port
- Built-in stirrer
 - Automatic, integrated magnetic stirrer adjustable from 200-2000 RPM
 - Optical feedback for automatic speed control
- Sealed solvent system
 - Change to fresh reagent in a matter of seconds without opening titration vessel
 - Minimizes exposure to ambient humidity
 - PTFE tubing is resistant to harsh KF chemicals
 - Sealed tube holder to collect PTFE tube after exchanging reagent
- PTFE bottle cap
 - Caps fit any GL45-threaded bottle
 - Chemically-resistant caps and fittings
 - Removable desiccant cartridges



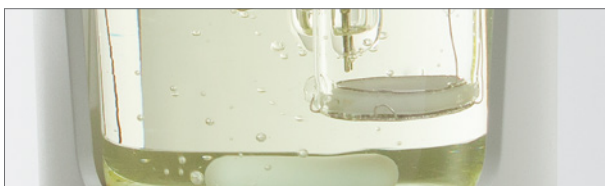
Adaptable, High Accuracy Moisture Determination

The HI904 Karl Fischer Coulometric Titrator for moisture analysis is an extension of Hanna's highly successful titrator platform. The HI904 combines an ultra-high electrolytically generated iodine dynamic dosing system with optically-regulated magnetic stirring, sophisticated endpoint determination, and background drift correction algorithms.

The result is an extremely adaptable titrator capable of titrating with superior accuracy and precision for samples with low moisture content. The HI904 applies a pulsed DC current for titrant generation, detects the endpoint and performs all necessary calculations automatically.

The HI904 comes equipped with a solvent handling system to reduce cell conditioning time and can be connected directly to a laboratory analytical balance via RS232 serial interface.

The HI904's powerful software and intuitive menus are easily navigated on the large, color LCD display, making it simple to view results. Choose from included methods or develop a custom method for almost any application or sample type. Methods (standard or user) and reports can be transferred between titrator and PC via USB interface by using the Hanna PC software. Software updates can be performed using a USB flash drive.



- **Fritted (Diaphragm) Generator**

- Anode/analyte and cathode/catholyte separated by glass diaphragm
- Prevents anode-generated iodine from being reduced to iodide at the cathode
- Ideal for extremely low water content, high accuracy demand, nitrogenous compounds and easily reduced samples



- **Fritless (No Diaphragm) Generator**

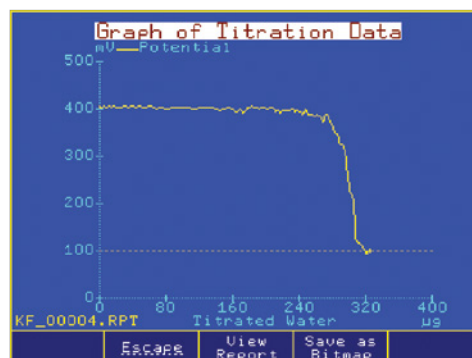
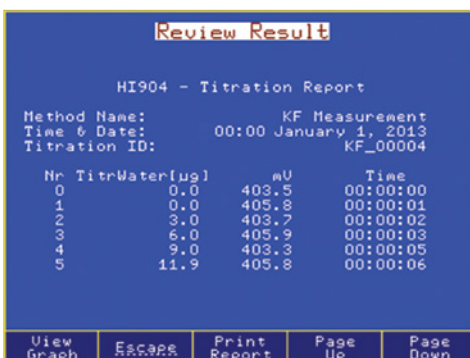
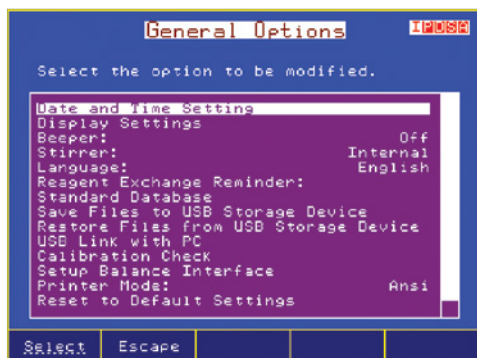
- Uses one easy-to-replace Karl Fischer reagent
- Lower and more stable drift rates
- Easier cleaning of generator cell

- Supports up to 100 methods (standard and user-defined)
- Results displayed directly in the selected units
- Titration graph can be displayed on-screen and saved as an image to be transferred to a PC or printed
- USB flash drive input
 - Transfer methods, reports and graphs to a PC or other titration system
 - Field upgradable software
- Incorporates into any GLP data management program:
 - Easily record all necessary GLP information with every sample, including company and operator name, date, time, electrode ID codes and standardization information
- Proper mixing of reagent and sample
 - Digital, magnetic stirring system with optical feedback
 - Adjustable stirring speed to facilitate mixing
- Flexible, accurate detection of the titration endpoint
 - Dual, platinum pin polarization electrode for bivalent detection of endpoint
- Multi-language support
- Balance interface
 - Automatically acquire sample mass via RS232 serial interface
- Easy to operate
 - User-friendly interface
 - Contextual help screens

Versatile Data Management

- HI900 Series titration systems can be easily incorporated into any existing GLP data management program:
 - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information

- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



- Customizable general options
 - Titration general options can be configured to user requirements

- Titration reports
 - Titration results can be viewed on-screen or transferred to a USB storage device

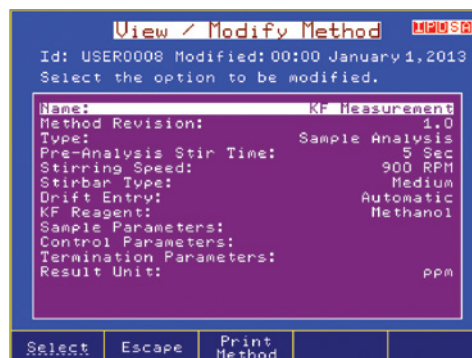
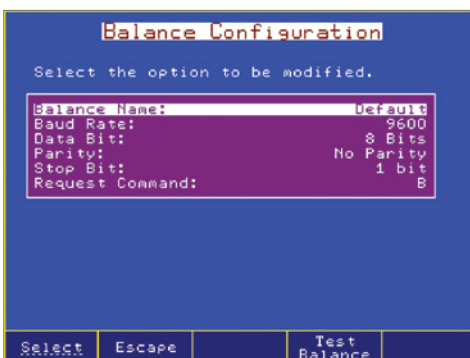
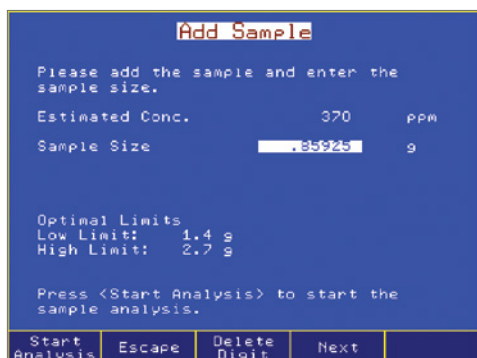
- Titration graphs
 - Titration graphs can be viewed on-screen or saved as images and transferred along with titration report



- Sample analysis
 - Interface displays real-time monitoring of water content and results

- Standby
 - The HI904 keeps the solvent dry between samples and monitors the drift rate

- Results
 - Titration results are displayed with options to average results or a user-customized report



- Sample addition
 - The HI904 recommends a sample size based on expected results

- Fully configurable balance interface
 - Enter sample weight automatically from any laboratory analytical balance with RS232 serial output

- Fully customizable titration methods
 - Customize methods for any application

Specifications

HI904

Titration	Range	1 ppm to 5%
	Resolution	0.1ppm to 0.0001%
	Result Units	%, ppm, ppt, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg Br/100g, g Br/100g, mg Br, g Br
	Sample Type	liquid or solid (external dissolution / extraction)
	Titration Vessel	operating volume between 100 - 200 mL
	Reagent Handling System	sealed system with integrated diaphragm air pump and beaker adapter
Generator Electrode	Configuration	diaphragm or diaphragm-less
	Current Control	automatic or fixed (400 mA)
	Electrode Type Detection	automatic
Determination	Pre Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop, or absolute drift stop
	Dosing	dynamic
	Result Statistic	mean, standard deviation
Detector Electrode	Type / Connection	dual platinum pin, polarization electrode / BNC connector
	Polarization Current	1, 2, 5, or 10 µA
	Voltage Range	2 mV to 1100 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1%
Peripheral Devices	PC	easily view, transfer, print or delete methods and reports via HI900 PC application
	USB Flash Drive	easily upgrade software or transfer methods and reports between devices using a USB drive
	Laboratory Analytical Balance	RS232 to connect a laboratory analytical balance
	Printer	print directly from the HI904 to a parallel port printer
	Monitor	instrument status and titrations can be viewed on a larger screen using any VGA compatible external monitor
	Keyboard	alphanumeric text can be entered using an optional PS/2 keyboard
Additional Specifications	Graphic Display	5.7" (320 x 240 pixel) color LCD
	Titration Methods	up to 100 (standard and user methods)
	Data Storage	up to 100 (titration and drift rate reports)
	GLP Conformity	Good Laboratory Practice and instrument data storage and printing
	Languages	English, Portuguese, Spanish, and French
	Enclosure Material	ABS plastic and steel
	Keypad	polycarbonate
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Operating Environment	10 - 40°C, up to 95% RH
	Storage Environment	-20 to 70°C, up to 95% RH
Dimensions / Weight	390 x 350 x 380 mm (15.3 x 13.8 x 14.9"); approximately 10 kg (22 lbs.)	
Ordering Information	HI904D-01 and HI904D-02 are supplied with diaphragm, HI904-01 and HI904-02 are supplied without diaphragm	
	All Models Include: dual platinum pin electrode, air pump assembly, titration vessel assembly (glass vessel, accessory port stopper, sample port cap and septum, stir bar, desiccant, desiccant cartridge, fittings), vessel support with adapter, pump locking screw with plastic head, reagent bottle assembly (bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), water bottle assembly (waste bottle, bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), calibration key, reagent exchange adapter, accessory holder assembly, joint grease, Karl Fischer generator electrode (removable generator electrode cable), USB cable, USB storage device, HI900 PC application software, power adapter, quality certificate and instruction manual binder.	

HI84530

Total Titratable Acidity Titrator and pH Meter

for Water Analysis

- **Piston driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **Two endpoints and two ranges**
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or a dirty/broken pH electrode
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 600 rpm regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - User intuitive design with large keys and easy to navigate screens
- **HELP features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



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

The HI84530 is an easy to use, fast and affordable mini automatic titrator with a pH meter designed for the rapid and accurate analysis of Total Titratable and Strong Acidity in water. 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.

The HI84530 incorporates a precise piston dosing system, which allows for a highly accurate determination of the amount of titrant used. It is also capable of dynamic dosing, making testing both faster and more accurate. Pump calibrations are performed with the provided Hanna standard and help assure the accuracy of the measurement.

An intuitive interface makes the instrument simple to use and the dedicated HELP key guides the user through set-up, calibration status, and troubleshooting.

This mini titrator includes a pre-programmed analysis method based on the Standard Methods of Water and Wastewater Determination. It uses a powerful algorithm which analyzes the shape of the electrode response in order to determine when the titration reaction has reached completion.

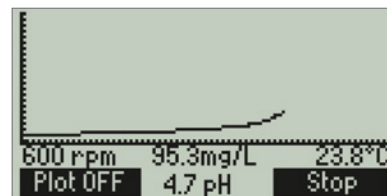
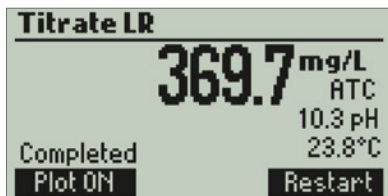
This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check™ function not only ensures an accurate pH reading when the HI84530 is used as a pH meter but also an accurate titration since the end point is determined by a set pH value.

Total Titratable Acidity

Water acidity is an important parameter to monitor as it can affect the corrosive capacity of water, chemical reaction rates and biological processes. Acidity can also be used to monitor pollution in wastewater and drinking water.

Total titratable acidity is a measure of all of the acid compounds present in a sample. Many factors can contribute to the acidity of a water in a sample, including strong acids (hydrochloric, sulfuric, nitric, etc.), weak acids (organic acids) and other acidic components (aluminum, iron, etc.).

On-screen Features



- **Easy and clear measurement**
 - The HI84530 is a single parameter titrator designed to measure total acidity in a few easy steps. The HI84530 displays the results directly on the screen in user-selectable units.
- **pH meter with electrode condition on display**
 - The HI84530 also functions as a pH meter. The HI84530 also displays the electrode condition on the LCD using Hanna's exclusive electrode diagnostics.
- **Titration curve displayed on screen**
 - The HI84530 offers real time graphing of the titration curve on the LCD.

Specifications

HI84530

Titrator	Range (as CaCO ₃)	Low Range: 15.0 to 400.0 mg/L; 0.3 to 8.0 meq/L High Range: 300 to 4000 mg/L; 6.0 to 80.0 meq/L
	Resolution	Low Range: 0.1 mg/L / 0.1 meq/L High Range: 1 mg/L / 0.1 meq/L
	Accuracy (@25°C/77°F)	Low Range: ±0.5 mg/L or 3% of reading, whichever is greater High Range: ±15 mg/L or 3% of reading, whichever is greater
	Titration Method	acid-base titration, total acidity / strong acidity
	Titration Principle	fixed endpoint titration : 8.30 pH (phenolphthalein) or 3.7 pH (Methyl Orange)
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
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; four available buffers (pH 4.01, 7.01, 8.30, 10.01)
Temperature Compensation	manual or automatic from -20 to 120 °C (-4 to 248 °F)	
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	Logging	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
	Power Supply	12 VDC power adapter
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
		HI84530-01 (115V) and HI84530-02 (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI84530-70 reagent kit for water analysis, 100 mL beakers (2), 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, power adapter, instruction manual and quality certificate.

HI84531

Titratable Alkalinity Titrator and pH Meter

for Water Analysis

- **Piston driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken pH electrodes
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 600 rpm regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - User intuitive design with large keys and easy to navigate screens
- **HELP features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



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

The HI84531 is a dedicated mini titrator and pH meter designed for low to high levels of alkalinity. It performs a potentiometric titration with a pH electrode to determine total titratable alkalinity or strong alkalinity in water. A titrant is slowly added to the sample while the pH and temperature are carefully monitored. The software analyzes the resulting titration curve and calculates the volume of titrant required to reach the endpoint. The user can choose either to measure strong alkalinity with a 8.30 pH end point (known as phenolphthalein alkalinity) or total alkalinity with a 4.50 pH endpoint (known as bromocresol green-methyl red alkalinity).

The dispensed titrant volume is used to automatically calculate the alkalinity, which can be displayed in mg/L or meq/L as CaCO₃.

This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check™ function not only ensures an accurate pH reading when the

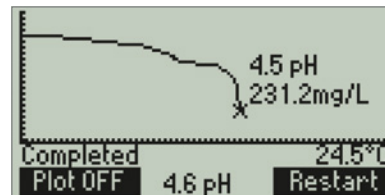
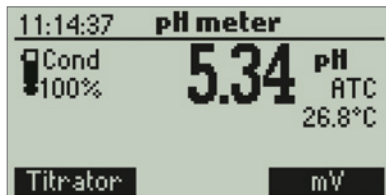
HI84531 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

Total Alkalinity

Total titratable alkalinity is a measure of primarily three types of alkalinities present in a water sample: hydroxide, carbonate and bicarbonate. Alkalinity in water can be the result of contributions from common chemicals, including carbonate, bicarbonate, hydroxide, phosphates, borate and organic acid salts.

The alkalinity of a water sample indicates its ability to resist pH change. The amount of alkalinity in water is mostly due to the bicarbonate/carbonate present. A low alkalinity level indicates that the water is susceptible to pH changes, while a high alkalinity level indicates that the water will be able to resist pH changes. Alkalinity can also be used to determine the corrosive capacity of water and can provide an estimation of water hardness.

On-screen Features



- Easy and clear measurement
 - These titrators are designed to measure in a few easy steps. The results are displayed directly on the screen.
- Electrode condition on display
 - These titrators feature a pH meter which also displays the electrode condition on the LCD.
- Titration Curve Displayed On Screen
 - The HI84531 offers real time graphing of the titration curve on the LCD.

Specifications

HI84531

Titrator	Range (as CaCO ₃)	Low Range: 30.0 to 400.0 mg/L; 0.6 to 8.0 meq/L High Range: 300 to 4000 mg/L; 6.0 to 80.0 meq/L
	Resolution	Low Range: 0.1 mg/L (ppm); 0.1 meq/L High Range: 1 mg/L (ppm); 1 meq/L
	Accuracy (@25°C/77°F)	Low Range: ±1 mg/L or 3% of reading, whichever is greater High Range: ±10 mg/L or 3% of reading, whichever is greater
	Titration Method	acid-base titration (strong alkalinity /total alkalinity)
	Titration Principle	endpoint titration : 8.30 pH (phenolphthalein) / 4.50 pH (bromcresol green-methyl red)
	Pump Volume	10 mL/min
	Stirring Speed	600 rpm
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, 8.30, 10.01)
mV	Temperature Compensation	manual or automatic
	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
Temperature	Accuracy (@25°C/77°F)	± 1.0 mV
	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
Additional Specifications	Accuracy	±0.4°C; ±0.8°F; ±0.4 K
	Logging	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
	Power Supply	12 VDC adapter
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
Weight	1.9 kg (67.0 oz.)	
Ordering Information	HI84531-01 (115V) and HI84531-02 (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI84531-70 reagent kit for water analysis, 100 mL beakers (2), 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, power adapter, instruction manual and quality certificate.	

HI84529

Titratable Acidity Mini Titrator and pH Meter

for the Dairy Industry

- **Piston-driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or dirty electrodes
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Application-specific FC260B half-cell pH electrode**
 - This electrode is designed to measure all types of dairy related products
- **HI5315 double junction half-cell reference electrode**
 - Features a plunger design to clear any logging of the outer junction
- **Help features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



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

The HI84529 is an easy-to-use, fast and affordable mini automatic titrator and pH meter designed for testing acidity levels in dairy products. 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.

This mini titrator includes a pre-programmed analysis method designed for acidity measurements for dairy analysis. It uses a powerful algorithm which analyzes the electrode response in order to determine when the titration reaction has reached completion. By simply pressing the START key, the HI84529 automatically performs a pH endpoint titration and displays results immediately in a choice of units.

Acidity Measurement and its Significance in the Dairy Industry

There are two fundamentally different measurements of dairy products: titratable acidity and pH. pH is a measurement of hydrogen ion concentration while titratable acidity is the neutralizing capacity of a dairy product with NaOH.

An increase in acidity can be caused by bacteria formation. Monitoring acidity is a way of determining the quality and freshness of dairy products. Acidity is determined by a pH end point titration using sodium hydroxide (NaOH), and is defined as the consumption necessary to shift the pH value from 6.6 (corresponding to fresh milk) to a pre-determined pH value. While pH 7.0 is the actual point of neutralization, phenolphthalein is commonly employed as a color indicator to determine the endpoint of reaction; with phenolphthalein, a color change occurs at pH 8.3. Titratable acidity is expressed in a variety of units based on the one which reflects the titration method and strength of NaOH used during titration.

Titratable acidity can be expressed in several units. Each of these units corresponds to a specific procedure used to titrate dairy products.

% Lactic Acid (% l.a.): is determined by titrating a 20 mL or 20 g sample diluted with twice its volume of deionized or distilled water with 0.1 M sodium hydroxide to a phenolphthalein end point.

Degree Soxhlet Henkel (°SH): is determined by titrating a 50 mL sample with 0.1 M sodium hydroxide to a phenolphthalein end point.

Degree Dornic (°D): is determined by titrating a 100 mL sample with N/9 sodium hydroxide to a phenolphthalein end point.

Degree Thörner: is determined by titrating a 10 mL sample diluted with twice its volume of deionized or distilled water with 0.1 M sodium hydroxide to a phenolphthalein end point.

From:	To:	Divide By:
%l.a.	°SH	0.0225
%l.a.	°D	0.0100
%l.a.	°Th	0.0090

Eliminate Subjectivity and Increase Efficiency

The HI84529 Mini Titrator eliminates the subjective endpoint color change detection determined by the human eye, and instead employs the sensitivity and accuracy of a pH sensor. The titration method is a potentiometric end point determination using a pre-determined pH value.

The titratable acidity values will vary depending on the method used. Select Low 50 to titrate a non diluted sample, or select low 20/High 20 to titrate 20 mL or 20 g samples that are diluted with twice its volume or deionized or distilled water. The HI84529 uses methods based on AOAC International and Standard Methods for the Examination of Dairy Products. Both of these methods report titratable acidity as % lactic acid, a rough conversion factor can be used to convert the results to the other available units.

The HI84529 can be customized to meet the needs of any dairy analysis lab. Samples can be titrated by weight or volume, diluted or non-diluted (low range only) and titrated to a fixed pH end point that can be adjusted by the user.

Specifications

HI84529

Titrator	Range	Low Range: %l.a.: 0.01 to 0.20; °SH: 0.4 to 8.9; °D: 1.0 to 20.0; °Th: 1.1 to 22.2 High Range: %l.a.: 0.1 to 2.0; °SH: 4.4 to 88.9; °D: 10 to 200; °Th: 11.1 to 222.2
	Resolution	Low Range: %l.a.: 0.01 ; °SH: 0.1; °D: 0.1; °Th: 0.1 High Range: %l.a.: 0.1; °SH: 0.1; °D: 1; °Th: 0.1
	Accuracy (@25°C/77°F)	Low Range: ± 0.01 %l.a. High Range: ± 0.1 %l.a.
	Method	acid-base titration
	Sample Size (LR 20)	20 mL or 20 g
	Sample Size (LR 50)	50 mL or 50 g
	Sample Size (HR 20)	20 mL or 20 g
	Principle	endpoint titration, adjustable (pH 8.0 - 8.7 in 0.1 increments)
	Pump Speed	10 mL/min
Stirring Speed	800 (Low Range) / 1000 (High Range)	
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; four available buffers (pH 4.01, 6.00, 8.30, 10.01)
	Temperature Compensation	manual or automatic
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
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	Electrodes	FC260B pH electrode with 1 m (3.3') cable (included), HI5315 reference probe with 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC power adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	HI84529-01 (115V) and HI84529-02 (230V) are supplied with HI84529-70 Reagent Kit for titratable acidity in dairy products, FC260B pH electrode, HI5315 reference electrode, HI7662-T temperature probe, HI7072 fill solution (30 mL), HI700640 cleaning solution for milk deposits (2 x 20 mL), capillary dropper pipette, 100 mL beakers (2), 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, power adapter, instruction manual and quality certificate.	

HI84532

Titratable Acidity Mini Titrator and pH Meter

for Fruit Juice

- **Piston-driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken electrodes
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 600 RPM regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - Intuitive design with large keys and easy to navigate screens
- **Help features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



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

The HI84532 digital automatic mini titrator and pH meter is designed for measuring the concentration of titratable hydrogen ions contained in fruit juice samples by neutralization with a strong base solution to a fixed pH endpoint as according to the Official Methods of Analysis of AOAC International. 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.

A clear and intuitive user interface allows users to easily navigate the HI84532's menus and functions. The HELP key located on the keypad aids in on-screen set-up, status and troubleshooting.

The HI84532 incorporates a precise piston dosing system, which allows for a highly accurate determination of the amount of titrant used. It is capable of dynamic dosing, making testing both faster and more accurate. Pump calibrations, performed with the provided Hanna standards, help assure the measurement accuracy.

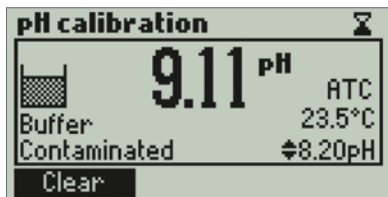
This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check™ function not only ensures an accurate pH reading when the HI84532 is used as a pH meter but also an accurate titration since the end point is determined by a set pH value.

The Importance of Titratable Acidity

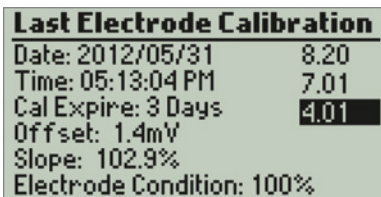
Titratable acidity is an important parameter in determining fruit maturity and sour taste in citrus fruits. The maturity of fruit is one of the most important factors to determine how well fruit will store and how it will taste. For some fruits, governmental quality standards (based on titratable acidity or the ratio of total soluble solids (°Brix) to titratable acidity) are in place to protect consumers. Immature fruit will normally have a low sugar to acid ratio as compared to mature fruit that will have a high sugar to acid ratio.

The HI84532 measures the concentration of titratable acids contained in fruit juice samples by neutralization with a strong base solution to a fixed pH. This value includes all the substances of an acidic nature in the fruit juice including: free hydrogen ions, organic acids and acid salts. Titratable acidity is expressed as g/100 mL of the predominant acid. The predominant acids in fruit depend on the type of fruit being tested and include citric acid, tartaric acid, and malic acid.

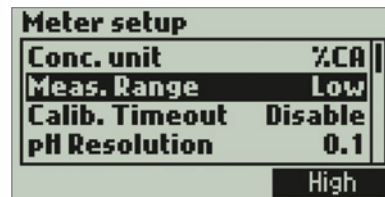
On-screen Features



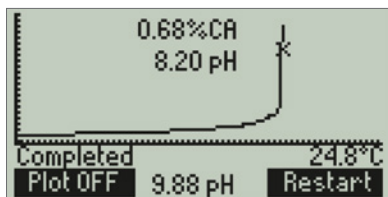
- **CAL Check™**
 - CAL Check™ is a Hanna exclusive process for checking the condition of pH electrodes for accurate measurements



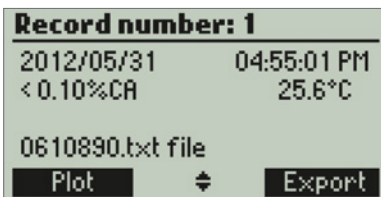
- **GLP**
 - The GLP feature records electrode and pump calibration data to help keep measurements accurate and reliable.



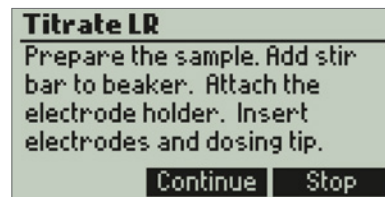
- **Setup screens**
 - The LCD features an easy to use setup screen.



- **Titration curve displayed on screen**
 - The HI84532 offers real time graphing of the titration curve on the LCD.



- **Log and recall data**
 - The HI84532 can log up to 400 samples (200 for titration; 200 for pH/mV) and recall or export data to a USB drive or PC.



- **Tutorial and help screens**
 - Accessing the tutorial menu provides helpful information during calibration and titration.

Specifications

HI84532

Titrator	Titratable Acidity Range	Low Range (5 mL sample): g/100 mL as citric acid: 0.10 to 2.00% CA; g/100 mL as tartaric acid: 0.11 to 2.35% TA; g/100 mL as malic acid: 0.10 to 2.09% MA High Range (5 mL sample): g/100 mL as citric acid: 1.00 to 10.00% CA; g/100 mL as tartaric acid: 1.17 to 11.72% TA; g/100 mL as malic acid: 1.05 to 10.47% MA
	Titratable Acidity Resolution	0.01%
	Accuracy (@25°C/77°F)	± 0.02% CA or 3% of reading whichever is greater
	Titration Method	acid-base titration
	Principle	endpoint titration: 8.1 pH
	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; four available buffers (4.01, 7.01, 8.20, 10.01)
	Temperature Compensation	manual or automatic
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 (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC power adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (6.70 oz.)
Ordering Information	HI84532-01 (115V) and HI84532-02 (230V) are supplied with HI84532-70 reagent Kit for titratable acidity in fruit juice, HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution (30 mL), 100 mL beakers (2), 20 mL beaker, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), dosing pump valve, 5 mL syringe, 1 mL plastic pipette, stir bar, power adapter, instruction manual and quality certificate.	

HI84533

Formol Number Mini Titrator and pH Meter

for Wines and Fruit Juices

- **Piston driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken pH electrode
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 600 RPM regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - Intuitive design with large keys and easy to navigate screens
- **Help features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



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

The HI84533 is an easy to use, fast and affordable mini automatic titrator designed for the rapid and accurate determination of formol number in wines or fruit juices. 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.

The HI84533 incorporates a precise piston dosing system which allows for a highly accurate determination of the amount of titrant used. It is also capable of dynamic dosing, making testing both faster and more accurate. A pump calibration performed with the supplied Hanna standard help assure the accuracy of the measurement.

This mini titrator includes a user adjustable programmed analysis method designed for formol number analysis. It employs a powerful and effective algorithm to analyze the pH response to determine the exact pH endpoint, then uses this algorithm to perform the necessary calculations.

This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check™ function not only ensures an accurate pH reading when the HI84533 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

Why Formol Number is an Important Determination

The content of amino-acids and other nitrogen compounds in fruit juices and wines is expressed as total assimilable nitrogen and is determined by the formol method using an acid-base titration. The formol number (also known as formol index) is a parameter used for evaluation of the quality of fruit juices and wines.

The HI84533 has two operating options:

1. pH measurement using the meter in pH mode
2. Formol number determination by titration of wines and fruit juice samples with sodium hydroxide solution to an 8.2 pH endpoint

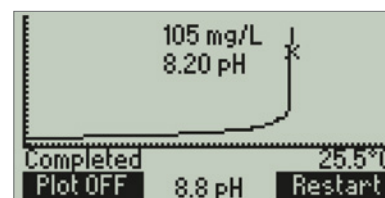
In wines, the concentration of alpha amino acid in grapes change as a function of maturity and crop load (yield to vine size ratio). The concentration increases with fruit maturation and decreases with crop load. In the fermentation of wine, there is a minimum amount of amino acid and other nitrogen compounds (eg; 150-200 mg/L of yeast assimilable nitrogen) that has to be present in the must/juice. Too low of an amount will result in a stuck fermentation in which there is not enough nitrogen for the yeast to thrive. Because of the importance of nitrogen in fermentation, it is desirable to determine the nitrogen concentration before fermentation.

In fruit juices, the formol nitrogen number is one of the basic parameters measured to determine quality. Depending on the type of fruit, the number can increase or decrease with maturity. In orange and grapefruit juice, lower values are observed when the fruit is not suitably mature or there has been frost damage. In pineapple juice, a low number could be indicative of over-dilution with water or a disproportionate amount of the core was used. To determine the adulteration of fruit juices, the formol number, along with the chromatography characterization of amino acids, can be used.

On-screen Features

Last Electrode Calibration	
Date: 2012/05/31	8.20
Time: 05:13:04 PM	7.01
Cal Expire: 3 Days	4.01
Offset: 1.4mV	
Slope: 102.9%	
Electrode Condition: 100%	

Record number: 2	
2013/03/13	15:09:08
111.5mg/L	25.5°C
3781134.txt file	
Plot	Export



- **GLP**
 - The GLP feature records electrode and pump calibration data to help keep measurements accurate and reliable.
- **Log and recall data**
 - The HI84533 can log up to 400 samples (200 for titration results; 200 for mV/pH) and recall or export data to a USB drive or PC.
- **Titration curve displayed on screen**
 - The HI84533 offers real time graphing of the titration curve on the LCD.

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 71.4 meq/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	Stirring Speed	600 rpm
	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
mV Meter	Calibration	one, two, or three- point calibration; 4 available buffers (4.01; 7.01; 8.20; 10.01)
	Temperature Compensation	manual or automatic
	Range	-2000.0 to 2000.0 mV
Temperature	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
Additional Specifications	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy	±0.4°C; ±0.8°F; ±0.4 K
	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body, refillable, with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 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)
Ordering Information	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
	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.	

HI84500 Sulfur Dioxide Mini Titrator

for Wine Analysis

- **Piston driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 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 700 RPM regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - User intuitive design with large keys and easy to navigate screens
- **HELP features**
 - Dedicated HELP key for content sensitive help
- **mV meter**



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

The HI84500 is an easy to use, fast and affordable automatic mini titrator designed for testing free or total sulfur dioxide (SO₂) 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 HI84500 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 HI84500 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 Important

Winemakers add sulfur dioxide to wine in order to inhibit bacteria and wild yeast growth and to serve as an antioxidant to prevent browning. When SO₂ is added to wine, a portion of it becomes immediately bound while a remaining portion is unbound SO₂. The portion that is unbound is also called free SO₂; it is responsible for protecting the wine.

The bound and free SO₂ together are referred to as total SO₂. The relationship between the amount of SO₂ added and the amount of free SO₂ is complex. This relationship is governed by the total amount of SO₂ in the wine and the ability of compounds (e.g. sugars, aldehydes, ketonic acid, quinones, anthocyanin) in the wine to bind SO₂.

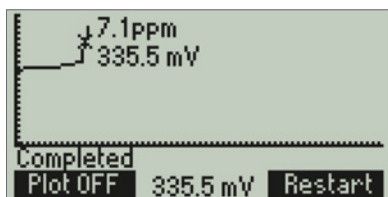
The exact relationship between free and bound SO₂ will vary from wine to wine. The amount of free SO₂ depends on how much is added, how much was present before the addition, and how much was immediately bound. Free SO₂ exists in two forms: bisulfite (HSO₃⁻) is the predominant form but is relatively ineffective and molecular SO₂ is the minor form and is responsible for protecting the wine. The amount of molecular SO₂ available in wine is dependent on the amount of free SO₂ present and the pH. Typically 0.8 ppm of molecular SO₂ 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 SO₂; if the pH was at 3.5 you would need double the amount, 44 ppm of free SO₂.

Molecular SO₂ 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 HI84500 can be used to test for free and total SO₂ in all wines, including red, which are difficult to test using traditional methods associated with a distinctive color change to determine the endpoint.

Application-specific ORP Electrode

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 biological samples such as wine. 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 repels wetness and coatings.

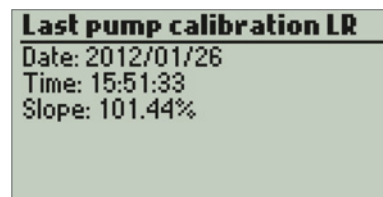
On-screen Features



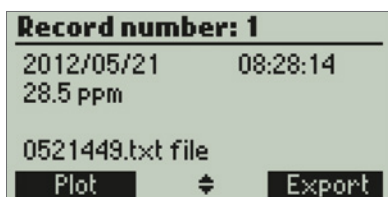
- Titration curve displayed on screen
 - The HI84500 offers real time graphing of the titration curve on the LCD.



- ORP
 - During ORP measurements, the stirrer icon will be displayed when the stirrer is on



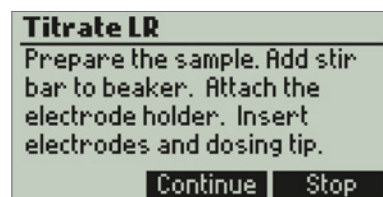
- GLP
 - Records pump calibration data to ensure measurements are accurate and reliable.



- Log and recall data
 - 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.



- Tutorial and help screens
 - Accessing the tutorial menu provides helpful information during calibration and titration.

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
	Stirring Speed	700 rpm
ORP Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±1 mV
Additional Specifications	Logging Data	up to 400 samples (200 ORP/mV, 200 titration)
	Electrode	HI3148B glass body ORP electrode 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.)	
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 (50 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.	

HI84502

Total Acidity Mini Titrator and pH Meter

for Wine Analysis

- **Piston driven pump with dynamic dosing**
 - For highly accurate, repeatable results
- **CAL Check™**
 - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken pH electrode
- **Log-on-demand**
 - Log data up to 400 samples (200 for titration; 200 for pH/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 600 RPM regardless of viscosity of solution
- **GLP features**
 - Date, time, offset, slope and buffers used
- **Easy-to-use interface**
 - User intuitive design with large keys and easy to navigate screens
- **Help features**
 - Dedicated HELP key for content sensitive help
- **pH/mV meter**
 - Doubles as a benchtop pH meter



An Easy-to-Use, All-in-one Solution

The HI84502 is an easy to use, fast and affordable automatic mini titrator designed for testing total acidity 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 results are displayed in g/L as tartaric acid. The HI84502 incorporates a precision piston driven dosing pump which allows for a highly accurate determination of the amount of titrant used. Pump calibrations performed with the provided Hanna standards assure the accuracy of measurements.

This mini titrator is also designed to be used as a benchtop pH/mV meter. As a pH meter, it has many features of a professional grade benchtop including automatic calibration up to three points with four available buffers, a 0.01 pH resolution, accuracy of ± 0.01 pH, automatic temperature compensation and comprehensive GLP data.

The GLP data includes date, time, offset, slope, and buffers used for calibration. Accuracy is always ensured with Hanna's unique CAL Check™ feature, which analyzes the response of the electrode during the calibration process. Based on electrode response in the buffer, indicators are displayed on screen to alert the user of potential problems during calibration. These indicators include Buffer Contaminated, Electrode Dirty/Broken, and overall probe condition. The CAL Check™ function not only ensures an accurate pH reading when the HI84502 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

The Significance of Titratable Total Acidity

Acids occur naturally during the growing of grapes and as part of the fermentation process. Wines show lower levels of acid when there is a hot growing season or when the grapes come from warmer regions. In the proper proportion, acids are a desirable trait and give the wine character. The three predominant acids in wine are tartaric, malic and citric. Tartaric acid is the principal acid in grapes and is a component that promotes a crisp flavor and graceful aging in wine. A moderate amount of a wine's acid comes from malic acid, which contributes to fruitiness. A small amount of titratable acidity comes from citric acid. Wine also contains trace amounts of other acids; the least desirable acid in wine is acetic acid, which, when present in more than a nominal amount, gives wine a sour or vinegary aspect.

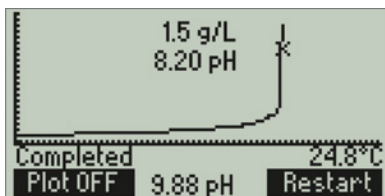
Total acidity, also called titratable acidity, is the sum of the fixed and volatile acids. In the United States the total acidity is usually expressed in terms of tartaric acid, even though the other acids are measured.

Total acidity directly affects the color and flavor of wine and, depending on the style of the wine, is sought in a perfect balance with the sweet and bitter sensations of other components. Too much acidity makes wine tart and sharp; too little makes wines flat, flabby and uninteresting. Proper acidity in wine is what makes it refreshing and an ideal accompaniment to food. The proper acid level of a wine varies, with sweeter wines generally requiring somewhat higher levels to retain the proper balance.

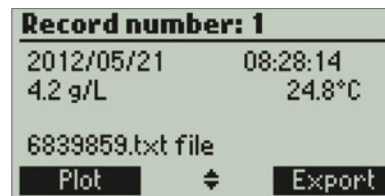
On-screen Features



- CAL Check™
 - A Hanna exclusive process for checking the condition of electrodes which helps keep measurements accurate.



- Titration Curve Displayed On Screen
 - The HI84502 offers real time graphing of the titration curve on the LCD.



- Log and Recall Data
 - Log up to 400 samples (200 for titration results; 200 for mV/pH) and recall or export data to a USB stick or PC.

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	Stirring Speed	600 rpm
	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	Temperature Compensation	manual or Automatic
	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
Temperature	Accuracy (@25°C/77°F)	±1.0 mV
	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
Additional Specifications	Accuracy (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1048B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 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.)	
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, (2) 20 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.	

Titration Solutions & Reagents



HI70401	potassium hydrogen phthalate, 20 g
HI70402	tartaric acid, 20 g
HI70403	sodium thiosulfate pentahydrate, 20 g
HI70404	KI powder packets, 100 packets
HI70405	glucose/fructose, 20 g
HI70406	sodium chloride, 20 g
HI70407	potassium iodate, 20 g
HI70408	oxalic acid, 20 g
HI70409	potassium permanganate, 20 g
HI70423	NaOH solution (0.11N), 1 L
HI70424	amino-propanol buffer, 25 mL
HI70425	sulfuric acid solution (16%), 500 mL
HI70426	glyoxal solution (40%), 100 mL
HI70427	HNO ₃ solution (1.5 M), 500 mL
HI70428	NaOH solution (0.25 N), 1 L
HI70429	AgNO ₃ solution (0.05 M), 1L
HI70432	hydrogen peroxide solution (3%), 25 mL
HI70433	stabilized iodine solution (0.01N), 1L
HI70434	phosphoric acid (85%), 500 mL
HI70435	NaOH solution (5 M), 500 mL
HI70436	deionized water, 1 G
HI70437	potassium iodide concentrated (30%) solution, 500 mL
HI70438	tris buffer set, 1L
HI70439	sodium thiosulfate solution (0.1 M), 1 L
HI70440	iodine stabilized solution (0.02 N), 1 L

HI70441	iodine stabilized solution (0.04 N), 1 L
HI70443	sulfuric acid solution (10%), 500 mL
HI70444	sulfuric acid solution (25%), 500 mL
HI70445	nitric acid solution (1 M), 500 mL
HI70446	Fehling solution A, 500 mL
HI70447	Fehling solution B, 500 mL
HI70448	AgNO ₃ solution (0.02 M), 1 L
HI70449	EDTA solution (0.02 M), 1 L
HI70453	HCl solution (0.02 N), 1 L
HI70454	NaOH solution (0.02 N), 1 L
HI70455	NaOH solution (0.01 N), 1 L
HI70456	NaOH solution (0.1 N), 1 L
HI70457	NaOH solution (1 N), 1 L
HI70458	H ₂ SO ₄ solution (0.01 M), 1 L
HI70459	H ₂ SO ₄ solution (0.05 M), 1 L
HI70462	HCl solution (0.01 N), 1 L
HI70463	HCl solution (0.1 N), 1 L
HI70464	HCl solution (1 N), 1 L
HI70465	hydrogen peroxide solution (30%), 30 mL
HI70466	phenylarsine oxide (PAO) solution (0.00564N), 500 mL
HI70467	pH 4.18 acetate buffer, 230 mL
HI70468	potassium iodide, 35g
HI70469	iodine solution (0.00188N), 230 mL (4)
HI70471	phenylarsine oxide (PAO) solution (0.000564N), 500 mL
HI70472	pH 7.15 phosphate buffer solution, 230 mL

Meter Accessories & Reagents



HI902C and HI901 Automatic Titration System Accessories

Accessory Code	Description
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)
HI900250	50 mL burette syringe
HI900225	25 mL burette syringe
HI900210	10 mL burette syringe
HI900205	5 mL burette syringe
HI900260	3-way valve (includes 3 gaskets and 2 screws)
HI900270	aspiration tube with fitting (includes blue protection tube, gasket, and tube lock)
HI900280	dispensing tube with fitting (includes standard dispensing tip, blue protection tube, gasket, and tube lock)
HI900301	overhead stirrer assembly (includes overhead stirrer and 3 propellers)
HI900302	replacement propellers (3)
HI900303	PVDF replacement propellers (3) for organic solvents
HI900310	overhead electrode holder (includes overhead stirrer without electronics or propeller)
HI900320	stirrer stand
HI7662-T	temperature probe
HI900942	tool for burette cap removal
HI900946	power adapter
HI920013	USB cable (HI902C only)



HI921 Autosampler Accessories

Accessory Code	Description
HI920-11660	single row with RFID, 16 beaker position, 60mm dia.
HI920-060	plastic beakers that fit HI920-11660 (20)
HI920-11853	single row with RFID, 18 beaker position, 53mm dia.
HI920-053	plastic beakers that fit HI920-11853 (20)
HI920-301	overhead stirrer
HI920-101	peristaltic pump with dispensing tubing
HI920-102	peristaltic pump with aspiration tubing
HI920-201	peristaltic pump replacement cap and rotor
HI920-202	peristaltic pump complete tubing set with plastic dispensing tube
HI920-203	peristaltic pump complete tubing set with stainless-steel aspiration tube
HI920-204	peristaltic pump roller tube (3)
HI920-111	membrane pump with tubing
HI920-212	membrane pump tubing set
HI920-290	5m TYGON tube
HI920-280	1.5m Burette/Autosampler titrant dispensing tube
HI920-302	replacement propellers (3)
HI920-303	high chemical resistance replacement propellers (3)
HI920-310	three electrode holder
HI920-900	USB memory stick
HI920-921	control panel for HI921
HI920-930	titrator/autosampler communication cable
HI920-931	BNC extension cable (1m)
HI920-932	reference extension cable (1m)
HI920-960	tray locking screw
HI7662-A	autosampler temperature sensor w/1.5m cable
HI731319	25 mm x 7 mm stir bars (10)



HI903 KF Volumetric Titrator
Accessories

Accessory Code	Description
HI76320D	dual platinum pin KF electrode with BNC connector
HI900100	titrant dosing Pump
HI900520	beaker assembly (beaker, dispensing tip, fittings, o-rings, top, holder, stirrer, solvent port plug)
HI900505	5 mL burette assembly (syringe, aspiration, and dispensing tubes)
HI900205	5 mL burette syringe
HI900260	3-way valve (3 gaskets and 3 screws)
HI900522	KF beaker (glass only)
HI900523	dispensing tip (2)
HI900527	septum (5)
HI900528	solvent port plugs (2)
HI900530	titrant bottle top assembly
HI900531	solvent/waste bottle top assembly
HI900532	desiccant cartridge for KF beaker or titrant bottle top
HI900533	desiccant cartridge for solvent or waste bottle top
HI900534	waste bottle
HI900180	solvent-handling pump
HI900535	tubing for solvent/waste handling
HI900536	tubing for solvent-handling pump
HI900540	O-ring set
HI900570	aspiration tubing and fitting (PTFE titrant tubing, blue protection and tube lock)
HI900580	dispensing tubing and fitting (PTFE titrant tubing)
HI900942	tool for burette cap removal
HI920013	USB cable for PC connection



HI904 KF Coulometric Titrator
Accessories

Accessory Code	Description
HI900561	titration vessel (glass only)
HI76330	detector electrode
HI900511	generator electrode with diaphragm
HI900512	generator electrode without diaphragm
HI900180	solvent handling pump
HI900181	reagent adapter holder assembly
HI900182	reagent adapter holder (glass only)
HI900560	titration vessel assembly
HI900568	reagent exchange adapter
HI900537	bottle top assembly (with molecular sieves)
HI900538	desiccant cartridge for reagent/waste bottles (with molecular sieve)
HI900535	tubing set for reagent/waste handling (2)
HI900536	tubing for solvent handling pump (2)
HI900566	open-top GL18 cap
HI900563	glass stopper, standard taper 19
HI900564	desiccant cartridge for generator electrode
HI900542	O-ring set
HI900534	waste bottle
HI900551	molecular sieves, 150 g
HI900940	calibration key
HI900946	24V power supply
HI900567	septum kit (5)
HI900543	glass joint grease
HI900931	generator cable
HI920013	USB Cable for PC Connection



HI84530 Total Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84530-50	titrant solution for low range, 120 mL
HI84530-51	titrant solution for high range, 120 mL
HI84530-55	pump calibration standard, 230 mL
HI84530-60	hydrogen peroxide, 30 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7061M	general purpose electrode cleaning solution, 230 mL

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe



HI84531 Titratable Alkalinity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84531-50	titrant solution for low range, 120 mL
HI84531-51	titrant solution for high range, 120 mL
HI84531-55	pump calibration standard, 230 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7061M	general purpose electrode cleaning solution, 230 mL

Accessory Code	Description
HI740236	5 mL syringe for mini titrator
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe



HI84529 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84529-50	titrant solution for low range 20, 120 mL
HI84529-51	titrant solution for high range 20, 120 mL
HI84529-52	titrant solution for low range 50, 120 mL
HI84529-55	pump calibration standard, 230 mL
HI7004M	pH 4.01 buffer, 230 mL
HI70060M	pH 6.00 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70640M	cleaning solution for milk deposits, 230 mL
HI70641M	cleaning and disinfection solution for dairy products, 230 mL
HI7072	reference half-cell filling solution, 1M KNO ₃ , 30 mL (4)

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
FC260B	replacement pH half-cell electrode for dairy
HI5315	replacement reference half-cell electrode
HI7662-T	replacement temperature probe



HI84532 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84532-50	titrant solution for low range, 120 mL
HI84532-51	titrant solution for high range, 120 mL
HI84532-55	pump calibration standard, 120 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7061M	general purpose cleaning solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)

Accessory Code	Description
HI731342	automatic pipette (2000 µL)
HI731352	tips for 2000 µL automatic pipette (4)
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe



HI84533 Formol Number Mini Titrator and pH Meter Reagents and Accessories

HI84500 Sulfur Dioxide Mini Titrator for Wine Analysis Reagents and Accessories

HI84502 Total Acidity Mini Titrator and pH Meter for Wine Analysis Reagents and Accessories

Reagent Code	Description
HI84533-50	titrant solution, 230 mL
HI84533-55	pump calibration standard, 120 mL
HI84533-60	additional reagent, 30 mL
HI84533-61	formol base reagent, 230 mL
HI84533-62	pH adjustment reagent, 30 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

Reagent Code	Description
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)
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7021M	ORP test solution @ 240 mV (@25 °C), 230 mL
HI7092M	oxidizing pretreatment solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI70300M	storage solution, 230 mL

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI3148B	ORP electrode for wine

Reagent Code	Description
HI84502-50	titrant solution, 230 mL
HI84502-55	pump calibration standard, 120 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731352	tips for 2000 µL automatic pipette (4)
HI731342	automatic pipette 2000 µL
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1048B	replacement pH electrode for wine
HI7662-T	replacement temperature probe



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