



Katalog opreme za testiranje bazenskih voda



pH and Temperature Testers

- **Waterproof**
 - Designed to float if accidentally dropped in a tank
- **Automatic Temperature Compensation**
 - All readings are compensated for variations in temperature
 - Temperature displayed in °C or °F along with pH reading
- **Stability indicator**
 - Meter displays a clock tag that will disappear when the reading has achieved stability
- **HOLD button**
 - Freezes reading on the display to allow recording of measurement
- **BEPS (Battery Error Prevention System)**
 - Meter will automatically shut off if there is not enough power to get an accurate measurement
- **Battery % level at startup**
- **Low Battery Indicator**
- **Automatic Shut-Off**
 - The meter can be set to automatically turn off after 8 minutes or 60 minutes to conserve battery life in the event that the meter is left on. The auto off feature can be disabled.



The pHep®4 and pHep®5 are waterproof pH testers that have many advanced features found in more expensive portable instrumentation. These ergonomic meters feature automatic one or two point calibration to a known buffer, automatic temperature compensation, battery percent level indicator at start up, and a stability indicator to alert the user when a stable reading has been obtained. The large multi level LCD display shows both pH and temperature simultaneously.



These meters also feature the HI73127 replaceable electrode with a stainless steel round connector and extendable cloth junction. This cartridge design has no pins to line up or that can break.

Specifications	HI98127 (pHep®4)	HI98128 (pHep®5)	
pH	Range	-2.0 to 16.0 pH	-2.00 to 16.00 pH
	Resolution	0.1 pH	0.01 pH
	Accuracy	±0.1 pH	±0.05 pH
Temperature	Range	-5.0 to 60.0°C / 23.0 to 140.0°F	-5.0 to 60.0°C / 23.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Additional Specifications	pH Calibration	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or pH 4.01 / 6.86 / 9.18)	
	Temperature Compensation	automatic	
	Battery Type / Life	1.5V (4) / approx. 300 hours of continuous use; auto-off after 8 minutes of non-use	
	Environment	-5 to 50°C (23 to 122°F); RH max 100%	
	Dimensions	163 x 40 x 26 mm (6.4 x 1.6 x 1.0")	
	Weight	100 g (3.5 oz.)	
Ordering Information	HI98127 (pHep®4) and HI98128 (pHep®5) are supplied with HI73127 pH electrode, HI73128 electrode removal tool, batteries and instructions.		

ORP and pH/ORP Testers

- Automatic one or two-point pH calibration (HI98121)
- Waterproof
 - Waterproof and designed to float
- ATC
 - Automatic Temperature Compensation (HI98121)
- HOLD feature
 - HOLD button to freeze readings on the display
- Battery indicator
 - Battery life indicator at startup

The HI98120 is a waterproof ORP and temperature meter, while the HI98121 measures pH, ORP and temperature. The housing of these testers has been completely sealed against humidity and is designed to float.

Electrode replacement with the stainless steel round connector means there are no pins to bend or break during replacement.

When the cloth junction becomes clogged and response time is sluggish, simply pull out 3 mm (1/8") to clear the clogging which will improve response time and stability.



HI98121

HI98120



Replaceable pH (HI98121) or ORP (HI98120) electrode cartridge



Exposed temperature sensor

The exposed stainless steel temperature sensor facilitates faster and more accurate temperature measurement.

Specifications	HI98120	HI98121	
pH	Range	-	-2.00 to 16.00 pH
	Resolution	-	0.01 pH
	Accuracy	-	±0.05 pH
ORP	Range	± 1000 mV	± 1000 mV
	Resolution	1 mV	1 mV
	Accuracy	±2 mV	±2 mV
Temperature	Range	-5.0 to 60.0°C / 23.0 to 140.0°F	-5.0 to 60.0°C / 23.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Additional Specifications	ORP Calibration	factory calibrated	factory calibrated
	pH Calibration	-	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)
	Temperature Compensation	-	automatic for pH readings
	Electrodes	HI73120 replaceable ORP electrode (included)	HI73127 replaceable pH electrode (included); fixed ORP sensor
	Battery Type / Life	1.5V (4) / approximately 250 hours of continuous use; auto-off after 8 minutes of non-use	
	Environment	-5 to 50°C (23 to 122°F); RH max 100%	
	Dimensions / Weight	163 x 40 x 26 mm (6.4 x 1.6 x 1.0") / 100 g (3.5 oz.)	
Ordering Information	<p>HI98120 (ORP) is supplied with HI73120 ORP electrode, HI73128 electrode removal tool, batteries and instructions.</p> <p>HI98121 (ORP/pH) is supplied with HI73127 pH electrode, HI73128 electrode removal tool, batteries and instructions.</p>		

EC/TDS and Temperature Testers

- **Waterproof**
 - Waterproof and designed to float
- **ATC**
 - Automatic Temperature Compensation
- **HOLD feature**
 - HOLD button to freeze readings on the display
- **BEPS**
 - Alerts the user of low battery power that could adversely affect readings

When the original DiST® (Dissolved Solids Tester) was first introduced, conductivity (EC) and total dissolved solids (TDS) measurements became easy and affordable. The DiST's ease of use, in combination with its affordability, made it the standard in EC and TDS measurement. Hanna continues the standard in EC and TDS testing with the DiST®5 and DiST®6.

These testers include features such as: a replaceable graphite electrode, adjustable TDS ratio, °C or °F measurement, Automatic Temperature Compensation (ATC) with adjustable β, battery level indicator, stability indicator, automatic shut-off and automatic calibration.

The graphite conductivity electrode offers greater accuracy by resisting contamination by salt deposits in the sample.

All of these features are packed in a floating, waterproof casing. These 3-in-1 testers are unmatched in EC/TDS and temperature measurements.



Replaceable graphite electrode

An easy-to-replace graphite electrode with a sturdy, snap-in connector means there are no pins to bend or break.



Specifications		HI98311 (DiST®5)	HI98312 (DiST®6)
EC	Range	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C / 32.0 to 140.0°F	0.0 to 60.0°C / 32.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Additional Specifications	Calibration	automatic, one point at 1413 µS/cm or 1382 ppm (mg/L)	automatic, one point at 12.88 mS/cm or 6.44 ppt (g/L)
	TDS Conversion Factor	adjustable from 0.45 to 1.00	
	Temperature Compensation	automatic, with β adjustable from 0.0 to 2.4% / °C	
	Probe	HI73311 replaceable EC/TDS graphite electrode (included)	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Battery Type / Life	1.5V (4) / approx. 100 hours of continuous use; auto-off after 8 minutes of non-use	
	Dimensions	163 x 40 x 26 mm (6.4 x 1.6 x 1.0")	
Weight	100 g (3.5 oz.)		
Ordering Information	HI98311 (DiST®5) and HI98312 (DiST®6) are supplied with HI73311 EC/TDS probe, HI73128 probe removal tool, batteries and instructions.		

HI98129 (Combo) · HI98130 (Combo)

pH/EC/TDS Testers

- **Waterproof**
 - Designed to float if accidentally dropped in a tank
- **Automatic Temperature Compensation**
 - All readings are compensated for variations in temperature
 - Temperature displayed in °C or °F along with pH reading
- **Stability indicator**
 - Meter displays a clock tag that will disappear when the reading has achieved stability
- **HOLD button**
 - Freezes reading on the display to allow recording of measurement
- **BEPS (Battery Error Prevention System)**
 - Meter will automatically shut off if there is not enough power to get an accurate measurement
- **Battery % level at startup**
- **Low Battery Indicator**
- **Auto-off**
 - Automatically shuts off after 8 minutes of non-use to maximize battery life

The HI98129 and HI98130 are waterproof testers that offer high accuracy pH, EC/TDS and temperature measurements in a single tester; no more switching between meters for your routine measurements. These floating, waterproof combination testers have an easy-to-read LCD and an automatic shut-off. pH and EC/TDS readings are automatically temperature-compensated.

These testers feature a replaceable pH electrode cartridge with an extendable cloth junction, as well as an EC/TDS graphite electrode. The renewable cloth junction provides an extended electrode life and the replaceable pH cartridge means that this tester does not need to be thrown away when the pH sensor is exhausted.

The EC/TDS conversion factor is user-selectable, as well as the temperature compensation coefficient (β).

Fast, efficient, accurate and portable, the Combo pH, EC/TDS and temperature testers combine all the features users have requested and more!



High accuracy EC/TDS graphite probe

The graphite conductivity probe provides greater accuracy because it cannot be contaminated by salt deposits in the solution. The exposed temperature sensor provides fast response times and guarantees highly accurate temperature compensated readings.



Replaceable pH electrode cartridge

The Combo features an easy-to-replace pH electrode. The sturdy, snap-in connector means there are no pins to bend or break.

Extendable cloth junction

Simply pull out 3 mm (1/8") and cut when the cloth junction becomes dirty to improve response time and stability.

LCD Display Features



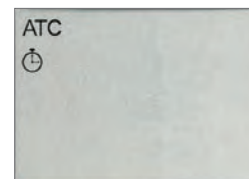
On-screen battery life

LCD indicates the percentage of battery power remaining upon startup.



HOLD function

The HOLD function “freezes” the LCD display temporarily.



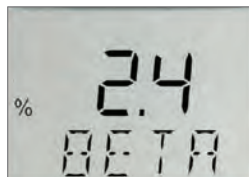
Instability & ATC indicators

Ensures reliable EC and TDS measurements. ATC symbol is shown when active.



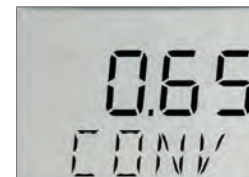
Standard or N.I.S.T buffer calibration

Automatic calibration is performed with two sets of memorized buffers for greater accuracy.



Adjustable temperature coefficient factor

Users can choose between different factors (β) for precise temperature compensated measurements.



Adjustable TDS conversion factor

For measurement accuracy, users can choose between a range of conductivity to TDS conversion factors.

Specifications	HI98129	HI98130	
pH	Range	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.05 pH	±0.05 pH
Conductivity	Range	0 to 3999 μ S/cm	0.00 to 20.00 mS/cm
	Resolution	1 μ S/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 mg/L (ppm)	0.00 to 10.00 g/L (ppt)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C / 32.0 to 140.0°F	0.0 to 60.0°C / 32.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Additional Specifications	EC/TDS Calibration	automatic, one point at 1413 μ S/cm or 1382 ppm (mg/L)	automatic, one point at 12.88 mS/cm or 6.44 ppt (g/L)
	pH Calibration	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)	
	Temperature Compensation	pH: automatic; EC/TDS: automatic with β adjustable from 0.0 to 2.4% / °C	
	TDS Conversion Factor	0.45 to 1.00	
	pH Electrode	HI73127 (replaceable; included)	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Battery Type / Life	1.5V (4) / approx. 100 hours of continuous use; auto-off after 8 minutes of non-use	
	Dimensions / Weight	163 x 40 x 26 mm (6.4 x 1.6 x 1.0") / 100 g (3.5 oz.)	
Ordering Information	HI98129 (Combo) and HI98130 (Combo) are supplied with HI73127 pH electrode and HI73128 electrode removal tool, batteries and instructions.		



Calibrate directly in buffer solution sachets

An easy calibration can be performed right in our buffer solution sachets for the most accurate readings.

HI981402 (Pronto pH)

pH Monitor

- Waterproof
- LED indicators

The HI981402 is a water-resistant pH meter with a built-in digital LCD. The meter is supplied with the HI1286 double junction, plastic bodied, gel-filled combination pH electrode with a flexible 2 m (6.6') cable. The electrode also has a unique clog-resistant PTFE junction that enhances both probe life and accuracy. The BNC connector is protected by a waterproof sleeve.

The alarm set point can be selected anywhere in the 3 to 11 pH range. A red LED warns the user in the event the reading is outside the setpoint by more than ± 0.5 pH. Calibration can be manually performed at two points through two easily accessible trimmers on the front of the unit.

The HI981402 is suited for outdoor installations and highly humid conditions. The molded eye allows the meter to be installed close to the sample and the 12 VDC power supply is ideal for continuous monitoring for extended periods of time.



Specifications	HI981402 (Pronto pH)
Range	0.0 to 14.0 pH
Resolution	0.1 pH
Accuracy (@25°C/77°F)	± 0.2 pH
Calibration	manual, one or two-point
Setpoint	adjustable from 3.0 to 11.0 pH
Alarm	red LED (blinks when pH reading differs from the setpoint more than ± 0.5 pH)
pH Electrode	HI1286 PEI body pH electrode with 2 m (6.6') cable (included)
Input Impedance	10^{12} Ohm
Power Supply	12 VDC adapter (included)
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	86 x 110 x 43 mm (3.4 x 4.3 x 1.7")
Weight	150 g (5.3 oz.)
Ordering Information	HI981402-01 (Pronto pH) (115V) and HI981402-02 (Pronto pH) (230V) is supplied with HI1286 pH electrode, calibration screwdriver, 12 VDC power adapter and instructions.



HALO[®]

Wireless pH Meters

Take lab grade measurements
using a smart phone or tablet.

HALO is the world's first professional pH probe with Bluetooth[®] Smart technology (Bluetooth[®] 4.0). This technology is energy efficient, allowing for low power consumption to maximize the life of the replaceable battery used in the pH electrode. HALO pH probes can be used virtually anywhere: in the field, laboratory, or classroom. Their versatility and ease of use will revolutionize the way pH is measured.



One Press Connect

Connect to the Hanna Lab App at the press of a button via Bluetooth® wireless technology (10 m range (33')). Visible from a distance, the LED halo light indicates the probe is active and transmitting.



One Button Sample Tagging

Pressing the button on the HALO pH probe or the probe icon in the Hanna Lab App will tag sample data for easy reference.



Easy to Replace Battery

The HALO's CR2032 lithium ion battery is easily replaced and lasts for approximately 500 hours.

HI11312



Compatible with:
iOS
Android™
edge@blu

Ideal for lab applications

HI11312 HALO is an innovative, pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. The electrode is a general purpose, glass body pH electrode ideal for routine laboratory measurement.

- **Glass body**
 - Non-porous surface that withstands harsh chemicals
- **Double junction**
 - Silver free outer reference that is compatible with most samples
- **Built-in temperature sensor**
 - High accuracy temperature compensated measurements
- **Refillable**
 - Allows the filling of the reference cell with electrolyte fill solution

Glass Body

The glass body of the HI11312 is resistant to many harsh chemicals and is easy to clean making it ideal for general laboratory use.

Double Junction

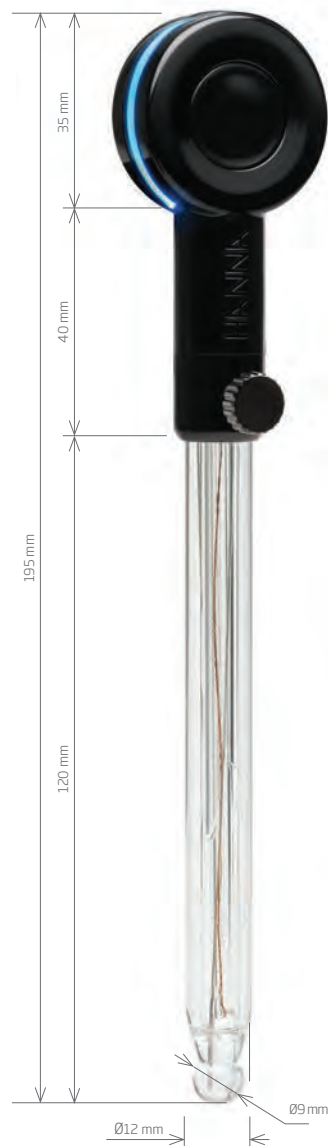
HI11312 is a double junction pH electrode in which the Ag/AgCl necessary for the reference cell is located behind an inner ceramic junction. The gel electrolyte between the inner and outer junction is silver free. This is important to prevent the precipitation of silver by Tris buffer, metals, and sulfides that would clog the junction leading to erratic readings.

Built-in Temperature Sensor

HI11312 has a thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature reading while being in the tip of the electrode allows for a rapid determination of the temperature as it impacts the effect on the glass membrane potential.

Refillable

HI11312 is a refillable pH electrode. Fill solution from the inside will diffuse through the ceramic junction as it is used and stored in storage solution. Electrolyte fill solution should be added to the probe when the level drops more than 1 cm (1/2") from the fill hole in order to maintain a good flow rate sustained by having adequate head pressure.



HALO Specifications

HI11312

Measurement Range	0.00 to 13.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	ceramic
Electrolyte	3.5M KCl (refillable)
Body Material	glass
Tip / Shape	spheric
Temperature Operating Range	-5 to 80°C (23 to 176°F)
Body Length/Overall Length	120 mm / 195 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof

Ordering Information

HI11312 (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, fill solution, battery, quality certificate and instruction sheet.



Hanna Lab App

Available on iOS and Android

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

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



Real-time Data

Displays updated pH and temperature every second

Views



Just the Essentials

Basic view provides measurement information in a clean, straightforward manner.

pH	°C	°F	Date	Time	Status
6.21	16.7	62.1	11/01	2:00:40 PM	
6.21	16.8	62.2	11/01	2:00:47 PM	
6.21	16.8	62.2	11/01	2:00:54 PM	
6.78	18.1	64.6	11/01	2:00:59 PM	High pH Alarm
6.72	18.2	64.8	11/01	2:01:06 PM	
6.72	18.4	65.1	11/01	2:01:13 PM	
6.72	18.4	65.1	11/01	2:01:20 PM	
6.71	18.8	65.8	11/01	2:01:26 PM	
6.71	18.8	65.8	11/01	2:01:33 PM	
6.60	22.2	72.0	11/01	2:01:39 PM	
6.60	22.2	72.0	11/01	2:01:46 PM	
6.63	21.7	71.1	11/01	2:01:53 PM	
6.60	21.5	70.7	11/01	2:02:00 PM	
6.62	21.5	70.7	11/01	2:02:07 PM	
6.72	21.5	70.7	11/01	2:02:14 PM	
6.72	21.5	70.7	11/01	2:02:21 PM	
6.73	18.8	65.8	11/01	2:02:28 PM	High pH Alarm
6.71	18.8	65.8	11/01	2:02:35 PM	High pH Alarm
6.71	18.8	65.8	11/01	2:02:42 PM	
6.71	18.8	65.8	11/01	2:02:49 PM	
6.71	18.1	64.6	11/01	2:02:56 PM	

All Information on Display

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



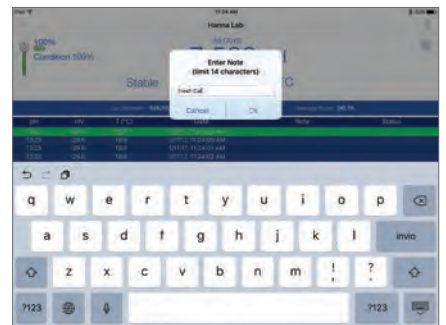
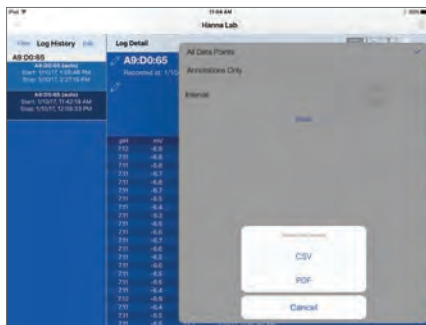
Fluid, Dynamic Graphing

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



Data Logging

pH	mV	T (°C)	Date	Note	Status
7.219	-11.8	22.9	1/10/17, 2:01:01 PM		
7.211	-11.3	23.0	1/10/17, 2:01:02 PM		
7.209	-11.7	22.9	1/10/17, 2:01:03 PM		
7.207	-11.7	22.9	1/10/17, 2:01:04 PM		
7.200	-11.5	22.9	1/10/17, 2:01:05 PM		
7.200	-11.7	22.9	1/10/17, 2:01:06 PM		
7.200	-11.7	22.9	1/10/17, 2:01:07 PM		
7.200	-11.8	22.9	1/10/17, 2:01:08 PM		
7.202	-11.8	22.9	1/10/17, 2:01:09 PM		
7.203	-11.8	22.9	1/10/17, 2:01:10 PM		
7.203	-11.8	22.9	1/10/17, 2:01:11 PM		
7.203	-11.7	23.0	1/10/17, 2:01:12 PM		
7.200	-11.8	23.0	1/10/17, 2:01:13 PM		
7.202	-11.8	23.0	1/10/17, 2:01:14 PM		
7.202	-11.8	23.0	1/10/17, 2:01:15 PM		
7.203	-11.8	23.0	1/10/17, 2:01:16 PM		
7.203	-11.8	23.0	1/10/17, 2:01:17 PM		
7.203	-11.7	23.0	1/10/17, 2:01:18 PM		
7.200	-11.8	23.0	1/10/17, 2:01:19 PM		
7.200	-11.8	23.0	1/10/17, 2:01:20 PM		
7.199	-11.7	23.0	1/10/17, 2:01:21 PM		
7.200	-11.7	23.0	1/10/17, 2:01:22 PM		
7.200	-11.7	23.0	1/10/17, 2:01:23 PM		
7.200	-11.7	23.0	1/10/17, 2:01:24 PM		



Data-logging

Data is automatically saved every hour. There are four ways to save and share data: All data since last auto save, Annotations only, All data within a timed interval, and Annotations within a timed interval.

Export Data

Share data via email in PDF or CSV format.

Custom Annotations

Saved data points may be annotated with measurement specific information.

GLP (Good Laboratory Practice)



Basic GLP

Displays date and time of current calibration along with probe offset and average slope. For tablet displays, basic GLP can be also displayed in table and graph views.



Full GLP

Displays date and time of current calibration, probe offset, and average slope along with calibrated buffers, mV values, temperature and slopes between each buffer. For tablet displays, full GLP can be also displayed in table and graph views.

Hanna Lab App Specifications*

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

Download Information

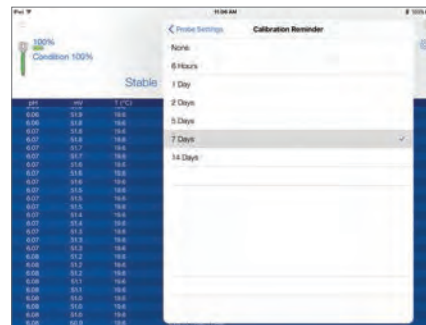


Calibration



Clear and Concise Calibration Screens

The Hanna Lab App allows for calibration of up to five points. The buffer value is automatically detected and temperature corrected to 25.0°C during calibration.



Calibration Reminder

Alerts users when HALO needs calibration.

Additional Features



Measurement Alerts

Readings that exceed user-defined alarm thresholds are highlighted in yellow on the measurement screen, graph, and table. Readings that exceed the probe specifications are highlighted in red.



Settings

Tap the gear icon in the top right corner of the measurement screen to access the Settings menu.



Help and Tutorials:

The Hanna Lab App also features demo probe mode, general app information, general HALO information, pH tutorial, maintenance tutorial, and contact information.

pH and ORP Solutions

Hanna seal of freshness

Our air tight bottle with tamper-proof seal of freshness ensures quality.



Table of Reference Temperatures

All calibration solution bottles are provided with a label presenting a reference table of the relationship between pH or conductivity values and temperature.

Ready-made Solutions

Buffer solutions that can be prepared in small batches from capsules, tablets or powders, are called "fresh" because they are prepared at the time of use. They are considered to be, but are not very precise. The quality of buffer solutions produced depends on many factors including the quantity and quality of the chemicals and distilled water used in production. Other important factors are the temperature and the instruments used to prepare them.

Hanna buffer solutions are checked carefully, in an aseptic environment with the highest precision reference instruments, and are calibrated to NIST Standards.

Hanna solutions are more convenient than the so-called "fresh" solutions. The main standard buffer solutions produced by Hanna are available in bottles or in sealed sachets, complete with or without a certificate of analysis.

The following pages show the series of calibration solutions in the various types of packages that will satisfy every application need, while always guaranteeing a highly accurate buffer.



Certified Solutions

For those operators who request it, we provide standard solutions complete with certificate of analysis. These certificates are prepared in accordance with NIST standards to avoid any possible error in determining the actual pH value. The certificate shows the date of production, batch number and expiration date.

Safety Data Sheets

Download Safety Data Sheets (SDS) from our website at: www.hannainst.com.

Calibration and Cleaning Solutions

The fundamental use of calibration and cleaning solutions is to correctly maintain electrode operation to assure accurate and reproducible readings. Often, readings are not correct because the sensors have not been properly handled. Using Hanna's wide range of solutions will help guarantee proper cleaning and calibration of electrodes and probes for maximum performance.



Sachets are Practical, Safe and Ready-to-Use

Single-use sachets are quick and easy to use. Each sealed, light-tight sachet holds just the right amount of solution. Every time your instrument and probe is maintained using Hanna sachets, it is like using a newly opened bottle of solution.

A wide range of pH, conductivity, TDS and cleaning solutions are available.

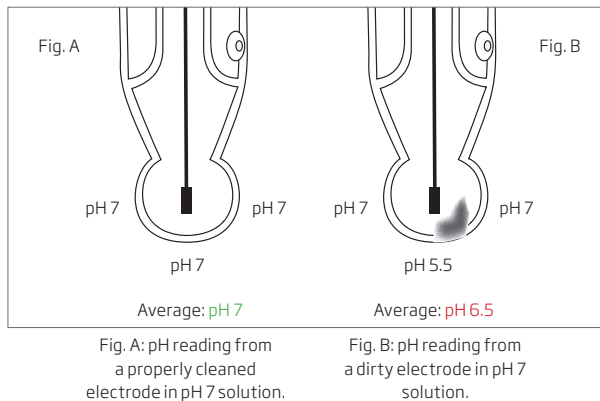
Table of Reference Temperatures

A label presenting a reference table of the relationship between pH or conductivity values and temperature is printed on all calibration solution sachets.



Electrode Cleaning, Calibration and Maintenance

Step 1: Cleaning



Just because you can't see contamination doesn't mean it isn't there.

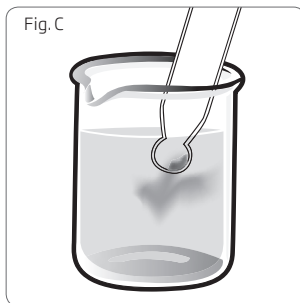
An electrode generates a voltage of the average hydrogen ion concentration from the surface area outside the pH bulb tip. Fig. A above shows that the clean electrode is submerged in pH 7 from all areas of the bulb surface.

When an electrode becomes dirty from use or neglect, the contaminated surface contributes to a voltage offset based on the surface area exposed to buffer as seen in Fig. B. Now the pH meter is mistakenly reading pH 6.5 instead of the actual pH 7.

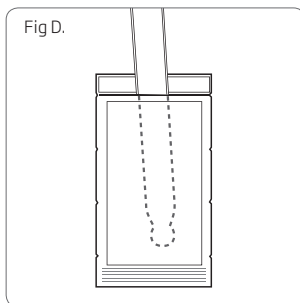
Always clean your electrode before calibration. If a dirty electrode is used for calibration, all subsequent measurements will be in error.

A dirty electrode can contaminate solutions.

Always use fresh solutions with each calibration. Buffer solutions can be contaminated by dirty electrodes as in Fig. C. Always clean your electrode before each calibration and measurement, and always use fresh solutions.



Contamination can take time to work its way around the beaker. If you notice fluctuations in your readings, it may be time to calibrate with fresh solutions.

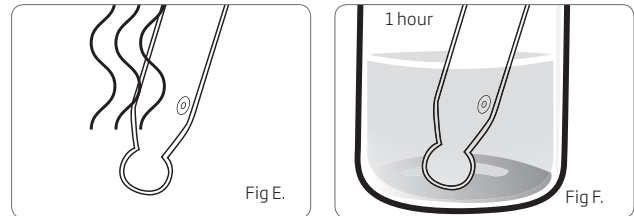


Fresh Every Time

Hanna single-use sachets are a great way to ensure your solution is always fresh. Fig. D shows just how easy it is to tear open the packet and insert the electrode. These light-tight sachets are also the ideal size for testers.

pH Cleaning Procedure

Hanna manufactures a full complement of cleaning solutions formulated to address general and specific cleaning needs.



IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with purified water (Fig. E) and soak the electrode in HI70300 or HI80300 Storage Solution for at least 1 hour before taking measurements (Fig. F).

General Cleaning

Soak in Hanna HI7061 or HI8061 General Cleaning Solution for approximately 30 minutes to dissolve mineral deposits and other general coatings.

Protein Coating

Soak in Hanna HI7073 or HI8073 Protein Cleaning Solution for 15 minutes to enzymatically dissolve deposits from protein sources.

Inorganic Soak

Soak in Hanna HI7074 Inorganic Cleaning Solution for 15 minutes. This cleaner is especially effective at removal of precipitates caused by reaction with the silver in the filling solution that may form in a ceramic junction.

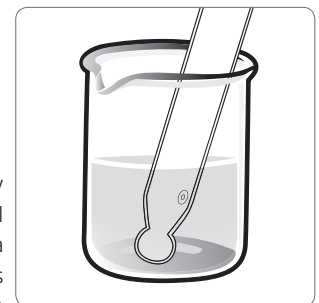
Oil and Grease Rinse

Oil and grease removal require the correct chemicals to solubilize the coating, but mild enough to leave the electrode unaffected. Use Hanna HI7077 or HI8077 Oil and Fat Cleaning Solution.

Step 2: Calibration

Calibration only counts when using fresh solutions and properly cleaned electrodes.

A pH electrode that is properly manufactured and kept clean will retain its measuring integrity for a long time. As a result of many factors such as age, use, poor maintenance or improper handling, any electrode will lose its integrity in time.



Routine maintenance will ensure accurate readings while extending the life of your electrode.

pH and ORP Solutions

A proper calibration restores the ability of an electrode to take accurate measurements. The most common cause for pH measurement inaccuracies is an unclean or improperly cleaned electrode. This is very important to note because during calibration, the instrument assumes that the electrode is clean and that the standardization curve created during the calibration process will remain a valid reference until the next calibration. pH meters on the market today will allow an offset of approximately ± 60 mV while Hanna only allows an offset of approximately ± 30 mV. An offset voltage is the mV at 7.00 pH. The deviation from 0 mV is not unusual, in fact it represents the true characteristics of a normal pH electrode.

An offset can be compensated for by calibrating a pH meter with a properly cleaned electrode. Calibrating a meter with a dirty electrode will only compound the problem. An mV offset that continues to deviate with a properly cleaned electrode is a good indication that the electrode may need to be replaced.

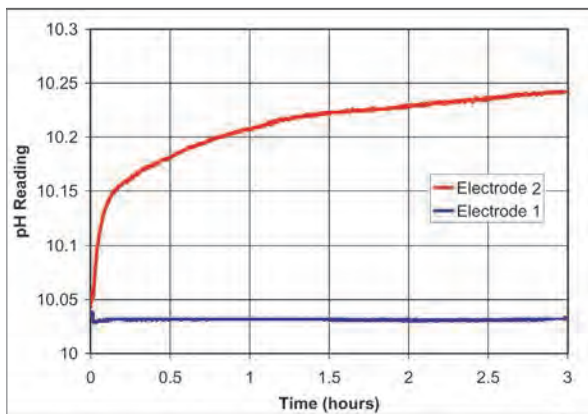


Fig G.

Electrode 1 has been properly cleaned before calibration.
Electrode 2 has not been properly cleaned.

Electrode readings may vary with insufficient cleanings.

Fig. G (above) shows that the pH measured by a dirty electrode changes over a short period of time, resulting from the residue on the pH electrode bulb. The resulting pH measurements, based upon the calibration of a coated electrode, will then be incorrect.

Conventional pH meters do not warn the user when a pH electrode is dirty or when a solution may be contaminated. A common example of this occurs just after calibrating the instrument; the pH electrode is immersed into the pH 7 buffer and the reading is lower than expected (pH 6.8 or 6.9 instead of pH 7). Hanna meters that feature our exclusive CAL Check™ electrode diagnostics automatically alert the user of any potential electrode or solution problems during calibration.

Precision Solutions

Hanna's wide range of solutions will help guarantee correct cleaning and calibration of electrodes and probes for maximum performance. Our solutions have been manufactured with your application in mind.

Step 3: Maintenance

Measurement

Always calibrate the electrode and pH meter together before making measurements. Rinse the pH electrode sensor tip with deionized or distilled water. For a faster response, and to avoid cross-contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested. Before taking measurements submerge the pH sensor tip and reference junction (~ 3 cm / $1\frac{1}{4}$ ") in the stirred sample.

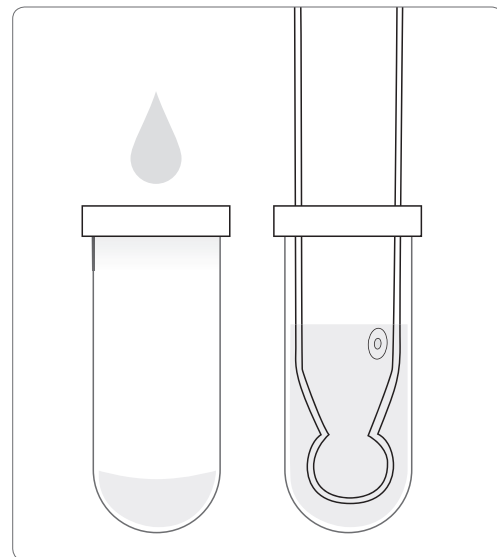


Fig H

Storage

To ensure an optimum response time, the glass sensor tip and the reference junction of the pH electrode should be kept moist and not be allowed to dry out.

Replace the solution in the protective cap with a few drops of HI70300 or HI80300 Storage Solution or, in its absence, with pH 4 or pH 7 buffer (Fig H).

NOTE: Never store the electrode in distilled or deionized water.



Inspect

Inspect and clean the electrode on a regular schedule to ensure the electrode will be ready when you need it. Coatings and reactions from samples result in decreased efficiency and longer response times.

pH Buffer Solutions

- **Safety Data Sheets**
 - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- **Expiration date**
 - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- **NIST traceability**
 - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.



- **Air-tight bottles**
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- **Single use sachets**
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- **FDA compliant bottles (HI80xx)**
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

4.01 pH Buffer Solution

This buffer value is widely used in water purification plants, in the food industry, and wherever the pH is expected to be slightly acidic.

4.01 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7004/1G	1 G (3.78 L) (color coded solution)		on request
HI7004/1L	1 L (color coded solution)		on request
HI7004L	500 mL		on request
HI7004L/C	500 mL		•
HI7004C	500 mL (color coded solution)	•	on request
HI7004M	230 mL		on request
HI7004-050	500 mL (GroLine)		•
HI7004-023	230 mL (GroLine)		•
HI7004-012	120 mL (GroLine)		•
HI8004L	500 mL	•	•
HI8004L/C	500 mL	•	•

4.01 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI70004C	20 mL	25 pcs.	•
HI70004G	20 mL (GroLine)	25 pcs.	•
HI70004P	20 mL	25 pcs.	

4.01 and 7.01 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI77400C	20 mL	10 pcs., 5 ea	•
HI77400P	20 mL	10 pcs., 5 ea	



pH Buffer Solutions

- **Safety Data Sheets**
 - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- **Expiration date**
 - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- **NIST traceability**
 - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.



7.01 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7007/1G	1 G (3.78 L) (color coded solution)		on request
HI7007/1L	1 L (color coded solution)		on request
HI7007C	500 mL (color coded solution)		on request
HI7007L	500 mL		on request
HI7007L/C	500 mL	•	•
HI7007M	230 mL		on request
HI7007-050	500 mL (GroLine)		•
HI7007-023	230 mL (GroLine)		•
HI7007-012	120 mL (GroLine)		•
HI8007L	500 mL	•	•
HI8007L/C	500 mL	•	•

- **Air-tight bottles**
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- **Single use sachets**
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- **FDA compliant bottles (HI80xx)**
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

7.01 pH @ 25°C, and Combination Packs - Sachets

Code	Value	Size	Package	Certificate of Analysis
HI70007C	7.01 pH	20 mL	25 pcs.	•
HI70007G	7.01 pH	20 mL	25 pcs.	•
HI70007P	7.01 pH	20 mL	25 pcs.	•
HI77700P	7.01 pH	20 mL	10 pcs.	•
HI770710C	10.01 & 7.01 pH	20 mL	10 pcs., 5 ea	•
HI770710P	10.01 & 7.01 pH	20 mL	10 pcs., 5 ea	•
HI77100C	1413 µS/cm & 7.01 pH	20 mL	20 pcs., 10 ea	•
HI77100P	1413 µS/cm & 7.01 pH	20 mL	20 pcs., 10 ea	•
HI77200P	1500 mg/L (ppm) & 7.01 pH	20 mL	20 pcs., 10 ea	•
HI77400P	4.01 & 7.01 pH	20 mL	10 pcs., 5 ea	•

7.01 pH Buffer Solution

pH 7.01 is the most widely used among all buffer solutions. For this reason we have prepared it in a wider variety of sizes to meet application demand.



pH Buffer Solutions

- **Safety Data Sheets**
 - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- **Expiration date**
 - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- **NIST traceability**
 - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.



- **Air-tight bottles**
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- **Single use sachets**
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- **FDA compliant bottles (HI80xx)**
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

10.01 pH Buffer Solution

pH 10.01 solution is commonly used to calibrate equipment used for analyzing basic samples. pH 10.01 buffer solution is available in various sizes to best fit your needs.



10.01 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7010/1G	1 G (3.78 L) (color coded bottle)		on request
HI7010/1L	1 L (color coded bottle)		on request
HI7010L	500 mL		on request
HI7010C	500 mL (color coded solution)		on request
HI7010L/C	500 mL		•
HI7010M	230 mL		on request
HI7010-050	500 mL (GroLine)		•
HI7010-023	230 mL (GroLine)		•
HI7010-012	120 mL (GroLine)		•
HI8010L	500 mL	•	•
HI8010L/C	500 mL	•	•

10.01 pH @ 25°C, and Combination Packs - Sachets

Code	pH Value	Size	Package	Certificate of Analysis
HI70010C	10.01	20 mL	25 pcs.	•
HI70010P	10.01	20 mL	25 pcs.	•
HI770710C	10.01 & 7.01	20 mL	10 pcs., 5 ea	•
HI770710P	10.01 & 7.01	20 mL	10 pcs., 5 ea	•

1.68 pH @ 25°C - Bottles

Code	Size	Certificate of Analysis
HI7001L	500 mL	on request
HI7001M	230 mL	on request

6.00 pH @ 25°C - Bottle

Code	Size	Package
HI70060M	230 mL	bottle

6.86 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7006/1G	1 G (3.78 L)		on request
HI7006/1L	1 L		on request
HI7006L	500 mL		on request
HI7006L/C	500 mL		•
HI7006M	230 mL		on request
HI8006L	500 mL	•	•
HI8006L/C	500 mL	•	•

6.86 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI70006C	20 mL	25 pcs.	•
HI70006P	20 mL	25 pcs.	

8.20 pH @ 25°C - Bottle

Code	Size	Package
HI70082M	230 mL	bottle

8.30 pH @ 25°C - Bottle

Code	Size	Package
HI70083M	230 mL	bottle

9.18 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7009/1G	1 G (3.78 L)		on request
HI7009/1L	1 L		on request
HI7009L	500 mL		on request
HI7009L/C	500 mL		•
HI7009M	230 mL		on request
HI8009L/C	500 mL	•	•
HI8009L	500 mL	•	•

9.18 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI70009C	20 mL	25 pcs.	•
HI70009P	20 mL	25 pcs.	

pH Buffer Solutions

- [Safety Data Sheets](#)
 - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- [Expiration date](#)
 - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- [NIST traceability](#)
 - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.
- [Air-tight bottles](#)
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- [Single use sachets](#)
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- [FDA compliant bottles \(HI80xx\)](#)
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

1.68 pH Buffer Solution

Plating bath samples, food samples and waste samples are often acidic in nature. To increase accuracy of your measurement at lower pH values, it is important to calibrate your electrode and meter at the appropriate pH. pH 1.68 buffer solution allows you to calibrate your measurement system in the acidic pH range and bracket your samples by using a second value at 4.01 pH or near 7.01 pH.

6.86 pH Buffer Solution

Many of our portable and benchtop instruments may now be calibrated with both pH 6.86 or pH 7.01 buffers.

8.20 and 8.30 pH Buffer Solution

To increase accuracy of your measurement, 8.20 and 8.30 pH buffer solution is available.

9.18 pH Buffer Solution

To increase accuracy of your measurement in an alkaline environment, it is important to calibrate your electrode and meter in that pH range and to preferably bracket your sample values. Hanna offers both pH 9.18 buffer and pH 10.01 buffer to fulfill this requirement.

ORP and Sample Preparation Solutions

- **Safety Data Sheets**
 - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- **Expiration date**
 - The production batch number and expiration date are reported on all Hanna calibration solutions.
- **Air-tight bottles**
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.

ORP Test and Pretreatment Solutions

ORP standard solutions allows users to test the precision of ORP electrodes. For example, by immersing the electrode in HI7021 solution, the reading should be at 240 mV (@25°C/77°F).

If the reading is outside the indicated interval, clean and condition your ORP electrode in Hanna pretreatment solution.

Use HI7092 for oxidizing or HI7091 for reducing pretreatment.

Soil Sample Preparation Solution

HI7051 Soil Sample Preparation Solution is an electrolyte solution used in the measurement of soil pH. The pH of soil is most commonly measured as either a water slurry or electrolyte slurry, where a set ratio of soil:solvent (solvent is water or electrolyte solution) is chosen; common ratios used for soil pH are 1:1, 1:2 or 1:5, where more solvent than soil is used when soils-to-be-analyzed contain high amounts of organic matter or clay. Use of an electrolyte solution is usually preferred as it is less affected by soil electrolyte concentration and provides a more consistent measurement for soils whose salt content may fluctuate as a result of seasonal conditions or crop residues.

Using the HI7051 solution prior to taking a measurement provides for a more accurate pH reading of soil samples



ORP Test and Pretreatment Solution Bottles

Code	Description	Size	Certificate of Analysis
HI7021L	240 mV ORP solution for platinum and gold electrodes	500 mL	on request
HI7021M	240 mV ORP solution for platinum and gold electrodes	230 mL	on request
HI7022L	470 mV ORP solution for platinum and gold electrodes	500 mL	on request
HI7022M	470 mV ORP solution for platinum and gold electrodes	230 mL	on request
HI7091L	reducing pretreatment solution (2 components)	500 mL + 14g (set)	
HI7092L	oxidizing pretreatment solution for ORP electrodes	500 mL	
HI7092M	oxidizing pretreatment solution for ORP electrodes	230 mL	

ORP Test and Pretreatment Solution Sachets

Code	Description	Size	Package	Certificate of Analysis
HI70022P	470 mV ORP solution for platinum and gold electrodes	20 mL	25 pcs.	•

Sample Preparation Solution Bottles

Code	Description	Size
HI7051M	soil sample preparation solution	230 mL
HI7051L	soil sample preparation solution	500 mL
HI70960	preparation solution for solid or semi-solid samples	30 mL



Electrode Storage Solutions

- Designed for storing any pH or ORP electrode.
- Special formulation
 - Special formulation to minimize microbial growth and osmotic/diffusion effects between the solution and inner reference electrolyte
- Expiration date
 - The production batch number and expiration date are reported on all Hanna calibration solutions.



- Air-tight bottles
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- FDA compliant bottles (HI803xx)
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

HI70300 is a storage solution prepared with reagent grade chemicals that can be used to ensure optimum performance of your pH and ORP electrodes.

To ensure an optimum response time, the glass sensor tip and the reference junction of the pH electrode should be kept moist and not be allowed to dry out when not in use.

Placing the pH electrode in a small glass filled with storage solution or replacing the solution in the protective cap is a suitable way to store the electrode. Storage solution should also be used to rehydrate the electrode after a cleaning procedure by soaking for at least one hour before taking measurements



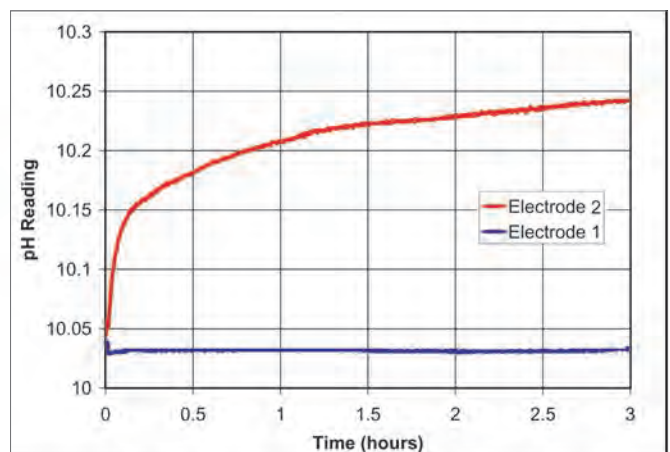
Electrode Storage Solutions

Code	Description	Package
HI70300L	storage solution for pH and ORP electrodes	500 mL bottle
HI70300M	storage solution for pH and ORP electrodes	230 mL bottle
HI70300S	storage solution for pH and ORP electrodes	30 mL bottle
HI70300G	storage solution for pH and ORP electrodes	20 mL sachet (25)
HI70300-050	storage solution for pH and ORP electrodes (GroLine)	500 mL bottle
HI70300-023	storage solution for pH and ORP electrodes (GroLine)	230 mL bottle
HI70300-012	storage solution for pH and ORP electrodes (GroLine)	120 mL bottle
HI80300L	storage solution for pH and ORP electrodes	500 mL FDA bottle
HI80300M	storage solution for pH and ORP electrodes	230 mL FDA bottle
HI5300-12	storage solution for pH and ORP electrodes	120 mL bottle



Electrode Cleaning Solutions for a Top Performing Sensor

- **Expiration date**
 - The production batch number and expiration date are reported on all Hanna calibration solutions.
- **Air-tight bottles**
 - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- **Single use sachets**
 - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- **FDA compliant bottles (HI80xx)**
 - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.



Electrode 1 has been properly cleaned before calibration.
 Electrode 2 has not been properly cleaned.

Electrodes can become dirty from use and will produce inaccurate results even as they read correctly in a pH buffer. Hanna's cleaning solutions eliminate impurities and residues that are left on electrode surfaces when immersed in samples during measurement and stored incorrectly. Hanna suggests cleaning the bulb and junction of your electrode on a regular basis to ensure that the probe is always clean and prevent any clogging of the junction.

General Use Electrode Cleaning Solutions - Bottles

Code	Application	Package
HI7061L	general purpose	500 mL bottle
HI7061-050	general purpose (GroLine)	500 mL bottle
HI7061-023	general purpose (GroLine)	230 mL bottle
HI7061-012	general purpose (GroLine)	120 mL bottle
HI7073L	proteins	500 mL bottle
HI7073M	proteins	230 mL bottle
HI7074L	inorganic substances	500 mL bottle
HI7074M	inorganic substances	230 mL bottle
HI7077L	oil and fats	500 mL bottle
HI7077M	oil and fats	230 mL bottle
HI8061L	general purpose	500 mL FDA bottle
HI8073L	proteins	500 mL FDA bottle
HI8077L	oil and fats	500 mL FDA bottle



Specific Electrode Cleaning Solutions - Bottles

Code	Description	Size
HI70621L	cleaning Solution for skin grease and sebum (Cosmetic Industry)	500 mL
HI70630L	acid cleaning solution for meat grease and fats (food industry)	500 mL
HI70631L	alkaline cleaning solution for meat grease and fats (food industry)	500 mL
HI70632L	cleaning and disinfection solution for blood products	500 mL
HI70635L	cleaning solution for wine deposits (winemaking)	500 mL
HI70636L	cleaning solution for wine stains (winemaking)	500 mL
HI70640L	cleaning solution for milk deposits (food industry)	500 mL
HI70641L	cleaning and disinfection solution for dairy products (food industry)	500 mL
HI70642L	cleaning solution for cheese deposits (food industry)	500 mL
HI70643L	cleaning and disinfection solution for yogurt products (food industry)	500 mL
HI70663L	cleaning solution for soil deposits (agriculture)	500 mL
HI70664L	cleaning solution for humus deposits (agriculture)	500 mL
HI70670L	cleaning solution for salt deposits (industrial processes)	500 mL
HI70671L	cleaning and disinfection solution for algae, fungi and bacteria (industrial processes)	500 mL
HI70681L	cleaning solution for ink stains	500 mL
HI70682L	cleaning solution for brewing deposits	500 mL



General Use Electrode Cleaning Solutions - Sachets

Code	Application	Package
HI70000P	rinsing	20 mL sachet (25)
HI700601P	general purpose	20 mL sachet (25)
HI70061G	general purpose (GroLine)	20 mL sachet (25)

Specific Electrode Cleaning Solutions - Sachets

Code	Description	Qty/Size
HI700620P	cleaning Solution for skin residuals	20 mL (25)
HI700621P	cleaning Solution for skin grease and sebum (Cosmetic Industry)	20 mL (25)
HI700630P	acid cleaning solution for meat grease and fats (food industry)	20 mL (25)
HI700635P	cleaning solution for wine deposits (winemaking)	20 mL (25)
HI700636P	cleaning solution for wine stains (winemaking)	20 mL (25)
HI700640P	cleaning solution for milk deposits (food industry)	20 mL (25)
HI700641P	cleaning and disinfection solution for dairy products (food industry)	20 mL (25)
HI700642P	cleaning solution for cheese deposits (food industry)	20 mL (25)
HI700643P	cleaning and disinfection solution for yogurt products (food industry)	20 mL (25)
HI700661P	general purpose cleaning solution for agriculture	20 mL (25)
HI700663P	cleaning solution for soil deposits (agriculture)	20 mL (25)
HI700664P	cleaning solution for humus deposits (agriculture)	20 mL (25)
HI700670P	cleaning solution for salt deposits (industrial processes)	20 mL (25)
HI700671P	cleaning and disinfection solution for algae, fungi and bacteria (industrial processes)	20 mL (25)
HI700680P	cleaning solution for cellulose deposits	20 mL (25)
HI700681P	cleaning solution for ink stains	20 mL (25)
HI700682P	cleaning solution for beer and wort (beermaking)	20 mL (25)

HI3829F

Free Chlorine Test Kit

With Color Cube

The HI3829F is a colorimetric chemical test kit that determines the free chlorine concentration within a 0.0 to 2.0 mg/L (ppm) range. The HI3829F is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- **High resolution**
 - Readings from 0.0 to 2.0 mg/L are determined to 0.5 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI3829F-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual.



Specifications	HI3829F Free Chlorine (as Cl_2)
Type	colorimetric
Range	0.0 to 2.0 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	HI3829F test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2
Reagent	HI3829F-050 free chlorine, 50 tests avg.

HI3831F

Free Chlorine Test Kit

With Color Cube

The HI3831F is a colorimetric chemical test kit that determines the free chlorine concentration within a 0.0 to 2.5 mg/L (ppm) range. The HI3831F is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- **High resolution**
 - Readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI3831F-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.



Specifications	HI3831F Free Chlorine (as Cl_2)
Type	colorimetric
Range	0.0 to 2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	HI3831F test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2.
Reagent	HI3831F-050 free chlorine, 50 tests avg.

HI3875

Free Chlorine Test Kit

Medium Range with Checker® Disc

The HI3875 is a chemical test kit that determines the free chlorine concentration within a 0.0 to 3.5 mg/L (ppm) range. The HI3875 is supplied with all of the necessary reagents and equipment to perform the analysis, including the Checker® disc for accurate determination. The test kit contains enough reagents to perform approximately 100 tests.

- **Complete setup**

- All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.

- **High resolution**

- Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.

- **Replacement reagents available**

- There is no need to buy a new kit when reagents are exhausted. The HI3875-100 can be ordered to replace the reagents supplied with the kit.



Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl₂) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.

Specifications	HI3875 Free Chlorine (as Cl ₂)
Type	checker disc
Range	0.0-3.5 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	DPD
Number of Tests	100 avg.
Ordering Information	HI3875 test kit comes with HI93701-0 free Cl reagent (100 packets), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	HI3875-100 free chlorine, 100 tests avg.

HI38018

Free Chlorine Test Kit

Low and Medium Range with Checker® Disc

The HI38018 is a chemical test kit that determines the free chlorine concentration in two ranges: 0.00 to 0.70 mg/L and 0.0 to 3.5 mg/L. The HI38018 is supplied with all of the necessary reagents and equipment to perform the analysis, including the Checker® disc for accurate determination. The test kit contains enough reagents to perform approximately 200 tests.

- **Complete setup**

- All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.

- **High resolution**

- Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
- Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.

- **Replacement reagents available**

- There is no need to buy a new kit when reagents are exhausted. The HI38018-200 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl₂) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.



Specifications	HI38018 Free Chlorine (as Cl ₂)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	HI38018 test kit comes with HI93701-0 free chlorine reagent (200 packets), demineralizer bottle with cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes.
Reagent	HI38018-200 free chlorine, 200 tests avg.

HI38017

Free & Total Chlorine Test Kit

Low and Medium Range with Checker® Disc

The HI38017 is a chemical test kit that determines the free and total chlorine concentration in two ranges: 0.00 to 0.70 mg/L and 0.0 to 3.5 mg/L. The HI38017 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 200 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- **High resolution**
 - Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
 - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI38017-200 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chlorine is the most commonly used water disinfectant in applications such as drinking water and wastewater treatment, pool and spa sanitization, and food processing and sterilization. Chlorine present in water binds with bacteria, leaving only a part of the original quantity (free chlorine) to continue its disinfecting action. If the free chlorine level is improper with respect to pH, water will have an unpleasant taste and odor and the disinfecting potential of the chlorine will be diminished.

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds; this results in diminished disinfecting capabilities compared with free chlorine. Chlorine compounds together with chloramines form combined chlorine. Combined chlorine and free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and lower volatility.



Specifications	HI38017 Free & Total Chlorine (as Cl ₂)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	HI38017 test kit comes with HI93701-0 free chlorine reagent (100 packets), HI93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes
Reagent	HI38017-200 free & total chlorine, 200 tests avg.

HI38020

Free & Total Chlorine Test Kit

Low, Medium and High Range with Checker® Disc

The HI38020 is a chemical test kit that determines the free and total chlorine concentration in three ranges: 0.00 to 0.70 mg/L, 0.0 to 3.5 mg/L, and 0.0 to 10.0 mg/L. The HI38020 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 200 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- **High resolution**
 - Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
 - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
 - Readings from 0.0 to 10.0 mg/L are determined to 0.5 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI38020-200 can be ordered to replace the reagents supplied with the kit.



Significance of Use

Chlorine is the most commonly used water disinfectant in applications such as drinking water and wastewater treatment, pool and spa sanitization, and food processing and sterilization. Chlorine present in water binds with bacteria, leaving only a part of the original quantity (free chlorine) to continue its disinfecting action. If the free chlorine level is improper with respect to pH, water will have an unpleasant taste and odor and the disinfecting potential of the chlorine will be diminished.

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds; this results in diminished disinfecting capabilities compared with free chlorine. Chlorine compounds together with chloramines form combined chlorine. Combined chlorine and free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and lower volatility.

Specifications	HI38020 Free & Total Chlorine (as Cl ₂)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm) 0.0-10.0 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm) 0.5 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	HI38020 test kit comes with HI93701-0 free chlorine reagent (100 packets), HI93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes
Reagent	HI38020-200 free & total chlorine, 200 tests avg.

HI3831T

Total Chlorine Test Kit

with Color Cube

The HI3831T is a colorimetric chemical test kit that determines the total chlorine concentration within a 0.0 to 2.5 mg/L (ppm) range. The HI3831T is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- **High resolution**
 - Readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI3831T-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing microorganisms. Chlorine also serves to improve the quality of drinking waters, as it reacts with ammonia, iron, manganese, sulfide, and some organic substances. Nevertheless, high amounts of chlorine will produce adverse effects like the formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). It remains essential to control the amount of added chlorine in order to fulfill the primary purpose of disinfecting while also minimizing any adverse effects.



Specifications	HI3831T Total Chlorine (as Cl ₂)
Type	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	HI3831T test kits comes with color comparison cube, 20 mL chlorine reagent 1, 15 mL chlorine reagent 2 and 15 mL chlorine reagent 3
Reagent	HI3831T-050 total chlorine, 50 tests avg.

HI38023

Total Chlorine Test Kit

Extended Range

The HI38023 is a titration-based chemical test kit that determines the total chlorine concentration within a 10 to 200 mg/L (ppm) range. The HI38023 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- **Complete setup**
 - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles and packets, spoon, and plastic syringe.
- **High resolution**
 - Readings from 10 to 200 mg/L are determined to 10 mg/L resolution.
- **Replacement reagents available**
 - There is no need to buy a new kit when reagents are exhausted. The HI38023-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing microorganisms. Chlorine also serves to improve the quality of drinking waters, as it reacts with ammonia, iron, manganese, sulfide, and some organic substances. Nevertheless, high amounts of chlorine will produce adverse effects like the formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). It remains essential to control the amount of added chlorine in order to fulfill the primary purpose of disinfecting while also minimizing any adverse effects.



Specifications	HI38023 Total Chlorine (as Cl ₂)
Type	titration
Range	10-200 mg/L (ppm)
Smallest Increment	10 mg/L (ppm)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	HI38023 test kit comes with 30 mL potassium iodide solution, sulfamic reagent (100 packets), 25 mL starch indicator, 100 mL thiosulfate reagent, 50 mL calibrated vessel, 1 mL syringe with tip, 1 mL plastic pipette and spoon.
Reagent	HI38023-100 total chlorine extended range, 100 tests avg.



HI3887

Quick-Check Swimming Pool Test Kit

Free Chlorine and pH

The HI3887 is a colorimetric chemical test kit that determines the free chlorine concentration and pH level in samples within a 0.0 to 2.5 mg/L (ppm) Cl⁻ range and 6.0 to 8.5 pH range. The HI3887 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents to perform approximately 50 tests for free chlorine and 100 tests for pH.

- **Complete setup**
 - All required materials are included with the test kit, such as the color comparison cubes and reagent dropper bottles.
- **High resolution**
 - Free chlorine readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
 - pH readings from 6.0 to 8.5 pH are determined to 0.5 pH resolution.

Significance of Use

Chlorine is one of the most commonly used disinfectants for drinking water, wastewater, and water used for pools and spas. It can be added to in various forms including calcium hypochlorite, sodium

hypochlorite, or in some instances, chlorine gas. When added to water, chlorine creates hypochlorous acid (HOCl) which dissociates into hypochlorite ion (OCl⁻).



hypochlorous acid ↔ hydrogen ion + hypochlorite ion

HOCl is the form of chlorine that acts as a stronger disinfectant as compared to OCl⁻. To ensure the added chlorine is effective at sanitizing, the pH of the water must be taken into account. Around pH 7.5, HOCl and OCl⁻ are present in relatively equal amounts. Below pH 7.5, the equilibrium shifts to favor HOCl; above pH 7.5, the equilibrium shifts to favor OCl⁻. Depending on the application, addition of chlorine is effective when added to water with a neutral or slightly acidic pH value.

When chlorine is first added to water, it is available as free chlorine. The measurement of free chlorine signifies the amount available for disinfection. Once chlorine begins to sanitize bacteria and pathogens present in the water, it becomes combined chlorine; combined chlorine is no longer available to act as a disinfectant.

Specifications	HI3887 Quick-Check Swimming Pool Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Free Chlorine	colorimetric	0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.
pH	colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	100 avg.
Ordering Information	HI3887 test kit includes color comparison cubes (2), 20 mL reagent 1, 12 mL reagent 2, 25 mL pH reagent and instructions.				
Reagents	HI3831F-050 free chlorine, 50 tests avg.				

The Significance of Pool and Spa Water Testing



Residual Disinfection and pH Control

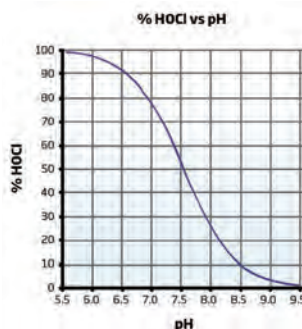
In swimming pool treatment, disinfection or sanitizing is essential to rid the pool of bacteria and control nuisance organisms like algae which may occur in the pool, filtration equipment, and piping.

There are a number of available disinfectant compounds, including chlorine, bromine and ozone dosing systems, of which chlorine is the most common.

Chlorine

Chlorine is a strong oxidizing agent that destroys organic pollutants and bacteria. Chlorine combines with compounds containing nitrogen to form chloramines, during which only part of the chlorine will be used while the rest remains active, continuing its disinfecting action.

Combined chlorine is the quantity of chlorine that has already combined with nitrogen containing compounds. It is much less effective as a disinfectant than free chlorine. The addition of combined chlorine, and free chlorine gives total chlorine. A pool manager needs to aim for the perfect balance where free and total chlorine are proportionally equal, and thus to keep the combined chlorine levels near zero. The presence of chloramines is undesirable because of the distinctive 'swimming pool smell' as well as irritation to the eyes and mucous membranes caused by combined chlorines like dichloramines.



Commercial chlorine for disinfection may be available as a gas (Cl_2), a liquid like sodium hypochlorite or bleach (NaOCl) or in a solid state like calcium hypochlorite, chlorohydrantoin or chlorocyanuric acid compounds. These compounds, once dissolved in water, establish equilibrium between the hypochlorous acid (HOCl) and the hypochlorite ions (OCl^-). Although both forms are considered free chlorine, it is the hypochlorous acid that provides the strongest disinfecting and oxidizing characteristic of chlorine solutions. The amount of hypochlorous acid in chlorinated water depends upon the pH value of the solution. Changes in pH value will effect the HOCl equilibrium in relation to the hydrogen and hypochlorite ions.

As depicted by the graph, HOCl decreases and OCl^- increases as pH increases. At a low pH, almost all the free chlorine is in the molecular form HOCl , and at a pH of around 7.5, the ratio between HOCl and OCl^- is 50:50. Since the ionic form OCl^- is a slow acting sanitizer while the molecular HOCl is a fast acting, it is important to measure pH regularly. As a general rule a pH of about 7.2 is recommended to maintain fast acting disinfection conditions.

Bromine

In many countries bromine sanitizing has been introduced as an alternative for chlorine, although it is not as strong. The advantage of bromine lies in its stability at higher temperatures (advantageous for heated pools and hot tubs), and its maintained disinfection power at a higher pH. Furthermore, there is very little reaction between bromine and nitrogen compounds, reducing the unpleasant odor, and eye irritation problems. The main disadvantage of bromine is the slower acting disinfecting power, making it less suitable for larger pools.



Ozone

Ozone is a very strong oxidizing agent that destroys organic compounds that are especially difficult to oxidize. It allows the pool manager to very efficiently remove combined chlorine without frequently refreshing large amounts of pool water. By the time the water passes through the filter units, ozone has already completed sanitizing, and it is not effected by the pH level.

Mainly because of its strong oxidizing power, the return water may contain trace concentrations of ozone. It is imperative to know that ozone is very unstable, so to ensure thorough sanitization of the water, low-level chlorination remains necessary.

The Water Balance and Langelier Index

Pool water characteristics need to be maintained in a balanced state to avoid numerous issues. Measuring certain variables is extremely important to predict if the water is corrosive or will cause scaling.

A saturation index developed by Dr. Wilfred Langelier is widely used to predict the balance of swimming pool waters. It represents the estimation of a solution's ability to dissolve or precipitate calcium carbonate deposits. A certain level of this precipitation (filming) is desired to insulate pipes and boilers from contact with water. When no protective filming is formed, water is considered to be corrosive. On the other hand, too much filming can develop into scaling and incrustation of the pipes.

In the treatment and monitoring of pool water, the pool manager must ensure that related parameters such as alkalinity, hardness and pH are carefully monitored in addition to sanitizing chemicals.

Calcium

The presence of calcium in the system is desired to ensure filming on those places where the temperature is relatively high, like in boilers and pipes transporting warm water. Scaling must be avoided because it reduces heat transfer and pump capacity, and causes cloudiness in the water.

It is recommended to maintain the calcium hardness value within the range from 200 to 400 ppm as calcium carbonate (CaCO_3).

Alkalinity

Alkalinity is the measure of the total concentration of alkaline substances, mostly bicarbonates, dissolved in the water. The higher the alkalinity, the more resistant the water is to pH change. At the same time, high alkaline water is a major contributor to scaling problems like incrustation in filtration equipment, pumps, and piping.

It is recommended to maintain the alkalinity value within the range from 80 to 125 ppm as calcium carbonate (CaCO_3).

pH

The pH of the water is an important factor since at lower pH levels the corrosion rate increases. If the alkalinity values are sufficiently high, it will not be difficult to control the pH. Most pool managers prefer to keep the pH between 7.2 and 7.4 to best maintain low corrosion rates and a sufficient activity of chlorine.

Langelier Index

The Langelier Index is a powerful tool to calculate the water balance, and to predict corrosion or scaling problems. Theoretically, a LI of zero indicates perfect water condition for swimming pools. If $LI > 0$, scaling and staining of the water is present, and if $LI < 0$ the water is corrosive and highly irritating. A tolerance of ± 0.4 is normally acceptable.

The Langelier formula is expressed as: $LI = pH + TF + HF + AF - 12.5$

Where:

LI = Langelier Index (also called Saturation Index)

pH = pH of the water

TF = temperature factor

HF = hardness factor, log (Ca hardness, ppm as $CaCO_3$)

AF = alkalinity factor, log (alkalinity, ppm as $CaCO_3$)

To calculate the exact Langelier Index of your water please use the **WATER INDEX** reference tables.

For most pools, water is balanced if:

- The pH value is maintained within the recommended ranges of pH 7.2 - 7.6
- Ideally, the Alkalinity should be maintained within a range of 80 - 125 ppm
- The Calcium Hardness should be maintained within a range of 200 - 400 ppm.

To calculate your water balance, three parameters must be measured; calcium hardness, alkalinity and pH. Find the hardness and alkalinity factor in the reference tables below.

The water temperature is, in general, maintained between $24^{\circ}C$ ($76^{\circ}F$) and $34^{\circ}C$ ($94^{\circ}F$). Assuming the temperature is kept within those ranges, an average value of 0.7 may be used.

$$\text{Water balance} = pH + TF + HF + AF$$

Water Balance	Condition	Recommendation
11.0-12.0	Corrosive	Increase pH and/or alkalinity
12.1-12.3	Acceptable Balance	Retest water frequently
12.4-12.6	Ideal Balance	Maintain
12.7-12.9	Acceptable Balance	Retest water frequently
13.0-14.0	Scale Forming	Reduce pH and/or alkalinity

Water Index Reference Table

Temperature			Calcium Hardness		Alkalinity	
$^{\circ}C$	$^{\circ}F$	TF	mg/L (as $CaCO_3$)	HF	mg/L (as $CaCO_3$)	AF
0	32	0	5	0.7	5	0.7
4	39	0.1	25	1.4	25	1.4
8	46	0.2	50	1.7	50	1.7
12	54	0.3	75	1.9	75	1.9
16	60	0.4	100	2.0	100	2.0
20	68	0.5	150	2.2	150	2.2
24	75	0.6	200	2.3	200	2.3
28	82	0.7	250	2.4	250	2.4
32	90	0.7	300	2.5	300	2.5
36	97	0.8	400	2.6	400	2.6
40	104	0.9	500	2.7	500	2.7
50	122	1.0	1000	3.0	1000	3.0



HI97000 Series

Advanced Waterproof Portable Photometers

These portable photometers are designed with an innovative optical system that offers superior performance in accuracy, repeatability, and the amount of time that it takes to do a measurement.

These waterproof meters are extremely user friendly with a tutorial mode that walks the user graphically, step by step, in performing a measurement. The use of a backlit dot matrix LED allows the use of virtual keys making operation of the meter very intuitive.



General Features

Waterproof casing

The casing offers IP67 waterproof protection and floats.

Advanced LED optical system

LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.

CAL Check™ functionality

Hanna's exclusive CAL Check feature allows for performance verification and calibration of the meter using NIST traceable standards. Our CAL Check standard vials are developed to simulate a specific absorbance value at each wavelength to verify the accuracy of subsequent readings. The CAL Check screen guides the user step-by-step through the validation process and user calibration.

Multiple measurement methods

Users can select the use of powder reagents supplied in packets or the use of low cost liquid reagents supplied in a dropper bottle.

Built-in reaction timer

Waiting the proper reaction time is of key importance when performing colorimetric measurements. The countdown timer displays the time remaining until a measurement will be taken, ensuring consistent results between sample measurements and users.

Large cuvette size

The sample cell of these photometers fits a round, glass cuvette with a 25 mm path length. The relatively long path length of the sample cuvette allows the light to pass through more of the sample solution, ensuring accurate measurements even in low absorbance samples. The cuvette holder features ridges to protect scratching of the optical path by the cuvette.

Intuitive dot matrix display

These photometers are designed with a backlit, graphic LCD. With virtual keys, a battery status indicator, and error messages. Users will find the interface intuitive and easy to read.

GLP

Good Laboratory Practice (GLP) shows the date and time of the last user calibration.



Auto logging

Log and recall the last 50 measurements.

Dedicated help

A dedicated help key provides information relating to the current meter operation, and can be used at any stage in the setup or measurement process to show contextual help.

On-screen tutorial mode with animations

The built in Tutorial mode guides users step-by-step through the measurement process.

Error messages

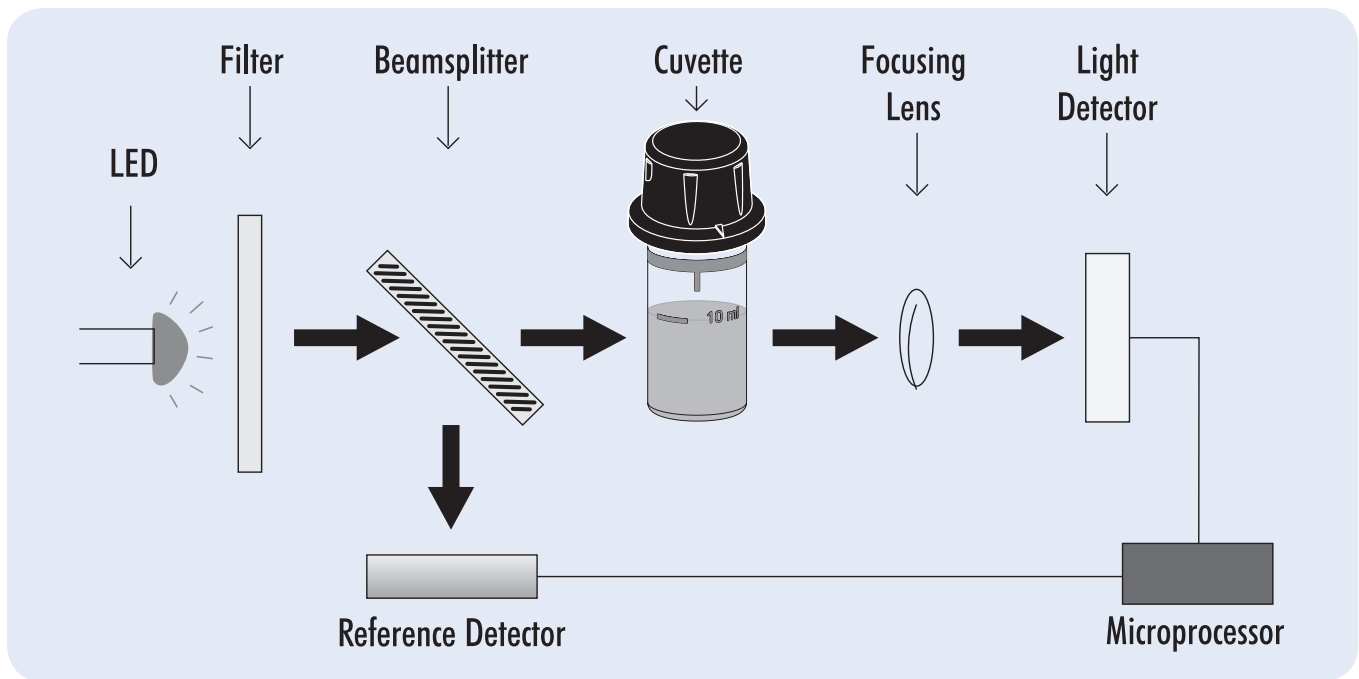
Messages appear on the display alerting to problems such as out of range, light low, light high, ambient temperature out of limits, and battery low.

Auto-off protection

These meters use three common AA batteries that allow for about 800 measurements to be taken. The auto-off feature automatically shuts off the meter after 15 minutes of inactivity in order conserve battery life.

Battery status indicator

Indicates the amount of battery life left.



Advanced Optical System

- LED that generates no heat
- 8 nm narrow band interference filter that is accurate to ± 1 nm and offers 25% increase in light efficiency.
- Reference detector that modulates the voltage to LED for consistent light output.
- A concave focusing lens that reduces errors from imperfections in the cuvette

High Efficiency Light Source

LED light sources offer superior performance compared to tungsten lamps. LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability. LEDs are available in a wide array of wavelengths, whereas tungsten lamps have poor blue/violet light output.

High Quality Filters

Improved optical filters ensure greater wavelength accuracy and allow a brighter, stronger signal to be received. The end result is higher measurement stability and less wavelength error.

Stable Light Source

The internal reference system of these photometers compensates for any drifts due to power fluctuations or ambient temperature changes. With a stable source of light the readings are fast and stable between your blank (zero) measurement and sample measurement.

Greater Light Yield

A focusing lens collects all of the light that exits the cuvette, reducing errors from imperfections and scratches that may be present in the glass. The use of the convex lens reduces the need for indexing cuvettes.



Method and Parameter

Chosen parameter and method used is displayed along with the reading.

Backlit LCD

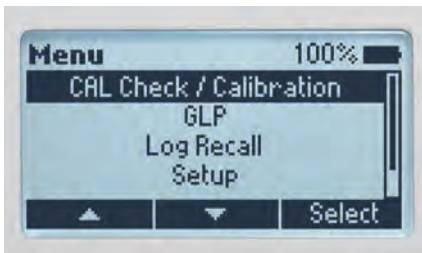
The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter.

Positive locking system

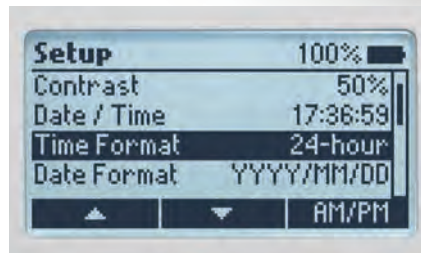
The Hanna positive-locking system ensures cuvettes are placed into the holder in the same position every time.



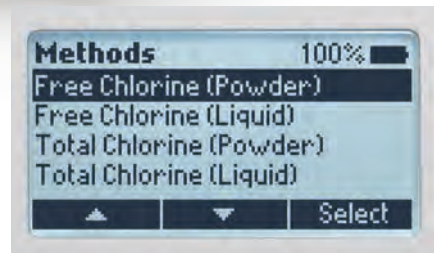
On-Screen Features



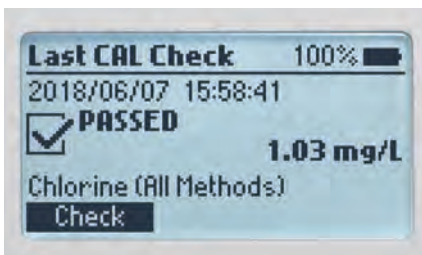
Advanced features such as CAL Check™ to verify performance, GLP for last calibration date, setup and ability to see all accessories used with the meter.



Setup options for meter personalization include date and time format, language, and enabling the tutorial mode



Choice of powder or economical easy to use liquid reagents



Backlit dot matrix LCD that offers an exceptionally intuitive user interface that is easy to read and understand



Tutorial mode for step-by-step instructions to guide a first time user to performing a measurement correctly.



Built-in reaction timer that ensures consistency amongst multiple users



Virtual keys



Menu available at the touch of a button



Contextual HELP button

A dedicated help key provides informational help relating to the current meter operation, and can be used at any stage in the setup or measurement process.

Solutions and Accessories

HI93703-50	Cuvette cleaning solution, 230 mL	HI7101412	Carrying case for HI977 series with two CAL Check standards
HI731318	Cuvette cleaning cloth (4)	HI7101413	Carrying case for HI977 series with three CAL Check standards
HI731331	Measuring cuvettes (4)	HI7101414	Carrying case for HI977 series with four CAL Check standards
HI731336N	Cuvette caps (4)		

HI97711

Free and Total Chlorine Portable Photometer

- **Advanced LED optical system**
 - LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.
- **CAL Check™**
 - Validate the performance of the instrument at any time and apply a user calibration using CAL Check cuvettes made with NIST traceable standards. The CAL Check screen guides the user step-by-step through the validation process and user calibration
- **Auto logging**
- **GLP**
 - Review of the last calibration date.
- **On-screen tutorial mode with animations**
 - The built in Tutorial mode guides users step-by-step through the measurement process.
- **Waterproof and floating IP67 case**
- **Auto-shut off**
 - Automatic shut off after 15 minutes of inactivity and 30 minutes before a read measurement.
- **Battery status indicator**
 - Indicates the amount of battery life left.
- **Built-in timer**
 - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- **Error messages**
 - Messages on display alerting to problems including no cap, high zero, and standard too low.
- **Units of measure**
 - Appropriate unit of measure is displayed along with reading.



Specifications		HI97711 Free and Total Chlorine
Measurement	Range (all methods)	0.00 to 5.00 mg/L (as Cl ₂)
	Resolution (all methods)	0.01 mg/L
	Accuracy @25°C (77°F) (all methods)	±0.03 mg/L ±3% of reading at 25 °C
	Method	Adaptation of the EPA DPD method 330.5
Measurement System	Light Source	light emitting diode
	Bandpass filter	525 nm
	Bandpass filter bandwidth	8 nm
	Bandpass filter wavelength accuracy	±1.0 nm
	Light Detector	silicon photocell
Additional Specifications	Cuvette type	round 24.6 mm diameter (22 mm inside)
	Auto logging	50 readings
	Display	128 x 64 pixel B/W LCD with backlight
	Auto-off	after 15 minutes of inactivity (30 minutes before a READ measurement)
	Battery type / Life	alkaline 1.5 V AA (3) / > 800 measurements (without backlight)
	Environment	0 to 50°C (32 to 122°F); 0 to 100% RH, non-serviceable
	Dimensions	142.5 x 102.5 x 50.5 mm (5.6 x 4.0 x 2.0")
Weight	380 g (13.4 oz.)	

HI97711 is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.

CAL Check standards and testing reagents sold separately

HI97711C includes photometer, CAL Check standards, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case.

Reagents sold separately

Ordering Information	
Reagents and Standards	HI97711
	HI97701-11 CAL Check standard cuvettes for free and total chlorine
	HI93701-01 free chlorine powder reagent (100 tests)
	HI93701-03 free chlorine powder reagent (300 tests)
	HI93701-F free chlorine liquid reagent (300 tests)
	HI93711-01 total chlorine powder reagent (100 tests)
	HI93711-03 total chlorine powder reagent (300 tests)
HI93701-T total chlorine liquid reagent (300 tests)	

HI97710

pH, Free and Total Chlorine Portable Photometer



- **Advanced LED optical system**
 - LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.
- **CAL Check™**
 - Validate the performance of the instrument at any time and apply a user calibration using CAL Check cuvettes made with NIST traceable standards. The CAL Check screen guides the user step-by-step through the validation process and user calibration
- **Auto logging**
- **GLP**
 - Review of the last calibration date.
- **On-screen tutorial mode with animations**
 - The built in Tutorial mode guides users step-by-step through the measurement process.
- **Waterproof and floating IP67 case**
- **Auto-shut off**
 - Automatic shut off after 15 minutes of inactivity and 30 minutes before a read measurement.
- **Battery status indicator**
 - Indicates the amount of battery life left.
- **Built-in timer**
 - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- **Error messages**
 - Messages on display alerting to problems including no cap, high zero, and standard too low.
- **Units of measure**
 - Appropriate unit of measure is displayed along with reading.

Specifications

HI97710 pH, Free and Total Chlorine

pH	Range	6.5 to 8.5 pH
	Resolution	0.1 pH
	Accuracy @25°C (77°F)	±0.1 pH of reading at 25°C
	Method	Adaptation of the Phenol Red method.
Chlorine	Range (all methods)	0.00 to 5.00 mg/L (as Cl ₂)
	Resolution (all methods)	0.01 mg/L
	Accuracy @25°C (77°F) (all methods)	±0.03 mg/L ±3% of reading at 25°C
Measurement System	Method	adaptation of the EPA DPD method 330.5
	Light Source	light emitting diode
	Bandpass filter	525 nm
	Bandpass filter bandwidth	8 nm
	Bandpass filter wavelength accuracy	±1.0 nm
	Light Detector	silicon photocell
Additional Specifications	Cuvette type	round 24.6 mm diameter (22 mm inside)
	Auto logging	50 readings
	Display	128 x 64 pixel B/W LCD with backlight
	Auto-off	after 15 minutes of inactivity (30 minutes before a READ measurement)
	Battery type / Life	alkaline 1.5 V AA (3) / > 800 measurements (without backlight)
	Environment	0 to 50°C (32 to 122°F); 0 to 100% RH, non-serviceable
	Dimensions	142.5 x 102.5 x 50.5 mm (5.6 x 4.0 x 2.0")
	Weight	380 g (13.4 oz.)

HI97710 is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.

CAL Check standards and testing reagents sold separately

Ordering Information

HI97710C includes photometer, CAL Check cuvette A, CAL Check cuvette B for free and total chlorine (powder and liquid), CAL Check cuvette B for pH, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case.

Reagents sold separately

Reagents and Standards

HI97710	HI97701-11 CAL Check standard cuvettes for free and total chlorine
	HI93701-01 free chlorine powder reagent (100 tests)
	HI93701-03 free chlorine powder reagent (300 tests)
	HI93701-F free chlorine liquid reagent (300 tests)
	HI93711-01 total chlorine powder reagent (100 tests)
	HI93711-03 total chlorine powder reagent (300 tests)
	HI93701-T total chlorine liquid reagent (300 tests)
	HI97710-11 CAL Check standard cuvettes for pH
	HI93710-01 pH reagent (100 tests)
	HI93710-03 pH reagent (300 tests)



HI97104

pH, Alkalinity, Free and Total Chlorine and Cyanuric Acid Portable Photometer

- **Advanced LED optical system**
 - LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.
- **CAL Check™**
 - Validate the performance of the instrument at any time and apply a user calibration using CAL Check cuvettes made with NIST traceable standards. The CAL Check screen guides the user step-by-step through the validation process and user calibration
- **Auto logging**
- **GLP**
 - Review of the last calibration date.
- **On-screen tutorial mode with animations**
 - The built in Tutorial mode guides users step-by-step through the measurement process.
- **Waterproof and floating IP67 case**
- **Auto-shut off**
 - Automatic shut off after 15 minutes of inactivity and 30 minutes before a read measurement.
- **Battery status indicator**
 - Indicates the amount of battery life left.
- **Built-in timer**
 - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- **Error messages**
 - Messages on display alerting to problems including no cap, high zero, and standard too low.
- **Units of measure**
 - Appropriate unit of measure is displayed along with reading.

Specifications

HI97104 pH, Alkalinity, Free and Total Chlorine, Cyanuric Acid

pH	Range	6.5 to 8.5 pH
	Resolution	0.1 pH
	Accuracy @25°C (77°F)	±0.1 pH of reading at 25°C
	Method	Adaptation of the Phenol Red method.
Alkalinity	Range	0 to 500 mg/L (as CaCO ₃)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±5 mg/L ±5% of reading at 25°C
	Method	Colorimetric method
Chlorine	Range (all methods)	0.00 to 5.00 mg/L (as Cl ₂)
	Resolution (all methods)	0.01 mg/L
	Accuracy @25°C (77°F) (all methods)	±0.03 mg/L ±3% of reading at 25°C
	Method	adaptation of the EPA DPD method 330.5
Cyanuric Acid	Range	0 to 80 mg/L (as CYA)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±1 mg/L ±15% of reading at 25 °C
	Method	adaptation of the turbidimetric method
Measurement System	Light Source	light emitting diode
	Bandpass filter	525 nm
	Bandpass filter bandwidth	8 nm
	Bandpass filter wavelength accuracy	±1.0 nm
	Light Detector	silicon photocell
	Cuvette type	round 24.6 mm diameter (22 mm inside)
Additional Specifications	Auto logging	50 readings
	Display	128 x 64 pixel B/W LCD with backlight
	Auto-off	after 15 minutes of inactivity (30 minutes before a READ measurement)
	Battery type / Life	alkaline 1.5 V AA (3) / > 800 measurements (without backlight)
	Environment	0 to 50°C (32 to 122°F); 0 to 100% RH, non-serviceable
	Dimensions	142.5 x 102.5 x 50.5 mm (5.6 x 4.0 x 2.0")
	Weight	380 g (13.4 oz.)

HI97104 is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.

CAL Check standards and testing reagents sold separately

Ordering Information

HI97104C includes photometer, CAL Check cuvette A, CAL Check cuvette B for free and total chlorine (powder and liquid), CAL Check cuvette B for pH, CAL Check cuvette B for cyanuric acid, CAL Check cuvette B for alkalinity, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101414 rigid carrying case.

Reagents sold separately

Reagents and Standards	HI97104	HI97775-11 CAL Check standard cuvettes for alkalinity
		HI775-26 alkalinity reagent
		HI97722-11 CAL Check standard cuvettes for cyanuric acid
		HI97722-01 cyanuric acid reagent (100 tests)
		HI97722-03 cyanuric acid reagent (300 tests)
		HI97701-11 CAL Check standard cuvettes for free and total chlorine
		HI93701-01 free chlorine powder reagent (100 tests)
		HI93701-03 free chlorine powder reagent (300 tests)
		HI93701-F free chlorine liquid reagent (300 tests)
		HI93711-01 total chlorine powder reagent (100 tests)
		HI93711-03 total chlorine powder reagent (300 tests)
		HI93701-T total chlorine liquid reagent (300 tests)
		HI93755-53 chlorine removal reagent
		HI97710-11 CAL Check standard cuvettes for pH
		HI93710-01 pH reagent (100 tests)
HI93710-03 pH reagent (300 tests)		



Hanna Checker® HC Series

Handheld Colorimeters

The Hanna Checker HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The Checker HC is both accurate and affordable.

The contoured style of the Checker HC fits in your palm and pocket perfectly, while the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

- Easier to use and more accurate than chemical test kits
 - High accuracy
 - Large, easy-to-read digits
 - Auto shut-off
- Dedicated to a single parameter
 - Designed to work with Hanna's reagents
 - Uses 10 mL glass cuvettes
- Small size, big convenience
 - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits in your palm or pocket
- Use for quick and accurate on-the-spot analysis
- Single-button operation: zero and measure
- Operated by a single AAA battery



Actual Size

Checker HC's are supplied in a case with custom insert



Calibration Checking Sets

Our optional Checker HC Calibration Sets provide a simple solution to validating your Checker HC. Each high quality set of standards is manufactured in our state-of-the-art facility and comes supplied with a Certificate of Analysis. The Certificate of Analysis provides the lot number, reference values and expiration date to provide traceability when certifying the Checker HC.



General Specifications for All Models

Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Dimensions	86 x 59.8 x 36.6 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)

Seawater and Fresh Water Alkalinity

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for
 - Saltwater aquariums (HI755)
 - Fresh water aquariums (HI775)



Alkalinity is one of the most important parameters to measure in aquariums. It helps to maintain a stable pH, an important factor for most aquatic life. In seawater, bicarbonate is the largest contributor to alkalinity and is a critical element needed for healthy corals. Corals need bicarbonate and carbonate available to form their skeletons. Without an adequate level, healthy coral growth is not possible. Since bicarbonate levels can be difficult to determine, total alkalinity is measured instead. The alkalinity of natural seawater is typically 125 ppm CaCO_3 (equivalent to 7 degrees of carbonate hardness, or dKH). In saltwater aquariums, typical alkalinity values can range from 125 to 200 ppm CaCO_3 (7 to 11.2 dKH).

The HI755, HI775 and HI772 Checker®HC's are simple, accurate, and cost effective ways to measure alkalinity in seawater and fresh water. Designed as a more accurate alternative to chemical test kits, these handheld colorimeters provide quick, accurate alkalinity testing results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press the button to zero.

Step Three - Remove sample and add reagent as stated in the manual.

Step Four - Reinsert sample and press the button to measure your results.

The contoured style of these Checker HCs fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

Specifications	HI755 (Seawater)	HI775 (Fresh water)	HI772 (Seawater)
Range	0 to 300 ppm CaCO_3	0 to 500 ppm CaCO_3	0.0 to 20.0 dKH
Resolution	1 ppm	1 ppm	0.1 dKH
Accuracy @25°C (77°F)	±5 ppm ±5% of reading		±0.3 dKH ±5% of reading
Light Source	LED @ 610 nm		
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after three minutes of non-use and two minutes after ten minutes of non-use after reading		
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	colorimetric method. The reaction causes a distinctive range of colors from yellow to green to blue to develop		
Ordering Information	HI755 Checker®HC is supplied with sample cuvettes with caps (2), seawater alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide.		
	HI775 Checker®HC is supplied with sample cuvettes with caps (2), alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide.		
	HI772 Checker®HC is supplied with sample cuvettes with caps (2), seawater alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide.		
Reagent Set	HI755-26 (25 tests)	HI775-26 (25 tests)	HI772-26 (25 tests)
Calibration Set	HI755-11	HI775-11	HI772-11

HI716

Bromine

Handheld Colorimeter



- Easier to use and more accurate than chemical test kits
 - DPD method
 - Accuracy ± 0.08 ppm $\pm 5\%$ of reading
 - 0.01 ppm resolution
 - Large, easy-to-read digits
 - Auto shut-off
- Dedicated to a single parameter
 - Designed to work with Hanna's powder reagents
 - Uses 10 mL glass cuvettes
- Small size, big convenience
 - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
 - Built-in reaction timer
 - Operated by a single AAA battery
- Ideal for
 - Water quality
 - Education
 - Swimming pools/hot tub sanitization
 - Environmental

The HI716 Checker HC is a simple, accurate, and cost effective way to measure Bromine. Designed as a more accurate alternative to chemical test kits, the HI716 provides quick, accurate results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press button to zero.

Step Three - Remove sample and add reagent packet.

Step Four - Reinsert sample, press and hold the button for 3 seconds to start reaction timer. reading will be taken automatically and the results displayed.

The HI716 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between bromine and the reagent causes a pink tint in the sample.

Specifications	HI716
Range	0.00 to 8.00 ppm
Resolution	0.01 ppm
Accuracy @25°C (77°F)	± 0.08 ppm $\pm 5\%$ of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between bromine and the reagent causes a pink tint in the sample
Ordering Information	HI716 Checker®HC is supplied with sample cuvettes with caps (2), bromine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	HI716-25 (25 tests)
Calibration Set	HI716-11

Free Chlorine and Ultra Low Range Free Chlorine

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
 - EPA approved DPD method
 - Large, easy-to-read digits
 - Auto shut off
- Dedicated to a single parameter
- Small size, big convenience
 - The Checker®HC easily fits into the palm of your hand or pocket
 - Use for quick and accurate on-the-spot analysis
 - Single-button operation: zero and measure
- Ideal for:
 - Swimming pools and spas
 - Fruit and vegetable sanitation
 - Disinfection
 - Drinking water and quality control checks



The HI701 and HI762 Checker®HC bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. These meters are accurate and affordable.

The HI701 features a resolution of 0.01 ppm and ± 0.03 ppm $\pm 3\%$ of reading accuracy while the HI762 features a resolution of 1 ppb and ± 20 ppb $\pm 4\%$ of reading accuracy. Both meters use an EPA approved DPD method.

The contoured style of the Checker HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

These meters are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker HC, press the button and read the results. It's that easy.

Specifications	HI701	HI762 (ULR)
Range	0.00 to 2.50 ppm	0 to 500 ppb
Resolution	0.01 ppm	1 ppb
Accuracy @25°C (77°F)	± 0.03 ppm $\pm 3\%$ of reading	± 20 ppb $\pm 4\%$ of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of USEPA method 330.5, DPD method	
Ordering Information	<p>HI701 Checker®HC is supplied with sample cuvettes with caps (2), free chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.</p> <p>HI762 Checker®HC is supplied with sample cuvettes with caps (2), free chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.</p>	
Reagent Set	HI701-25 (25 tests)	HI762-25 (25 tests)
Calibration Set	HI701-11	HI762-11

Total, Total Ultra Low Range and Ultra High Range Chlorine

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
 - Swimming pools and spas
 - Fruit and vegetable sanitation/disinfection
 - Drinking water
 - Quality control checks
 - Environmental
 - Hospitality
 - Food processing

Chlorine is the most common water disinfectant. The monitoring of chlorine is crucial in applications such as swimming pools and spas, fruit and vegetable sanitation, disinfection and drinking water. By monitoring this crucial parameter, serious health and safety risks can be avoided.

The HI711, HI761, and HI771 Checker®HC Handheld Colorimeters bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. Hanna's Checker HC's are an accurate and affordable alternative.

The contoured style of these Checkers fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

These Checker HC's are designed to be portable and easy to use, providing quick, accurate results in four easy steps.

Specifications	HI711 (Total)	HI761 (Total ULR)	HI771 (UHR)
Range	0.00 to 3.50 ppm	0 to 500 ppb	0 to 500 ppm
Resolution	0.01 ppm	1 ppb	1 ppm
Accuracy @25°C (77°F)	±0.03 ppm ±3% of reading	±5 ppb ±5% of reading	±3 ppm ±5% of reading
Light Source	LED @ 525 nm		
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	adaptation of USEPA method 330.5, DPD method		adaptation of the Standard Methods for Water and Wastewater, 20th Edition 4500-Cl
Ordering Information	<p>HI711 Checker®HC is supplied with sample cuvettes with caps (2), total chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.</p> <p>HI761 Checker®HC is supplied with sample cuvettes with caps (2), total chlorine ULR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.</p> <p>HI771 Checker®HC is supplied with sample cuvettes with caps (2), Chlorine UHR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.</p>		
Reagent Set	HI711-25 (25 tests)	HI761-25 (25 tests)	HI771-25 (25 tests)
Calibration Set	HI711-11	HI761-11	HI771-11



Swimming Pools and Chlorine for Disinfection

In regards to swimming pool treatment, disinfection or sanitizing basically means to rid the pool of bather contamination, destroy bacteria, and control nuisance organisms like algae, which may occur in the pool, filtration equipment, and piping. Of the many techniques used (chlorine, bromine and iodine dosing systems), chlorine is the most common.

Chlorine

Chlorine is a strong oxidizing agent that destroys mostly organic pollutants and bacteria and can combine with nitrogen containing compounds, forming chloramines. When dosing chlorine for disinfection, only a portion of the dosed chlorine remains active to actually continue the disinfection process.

When free chlorine combines with a nitrogen containing compound it becomes a less efficient disinfectant called chloramines. The addition of these two parts gives total chlorine. The target is to keep free and total chlorine equal, and thus to maintain the combined chlorine concentration (chloramines) near zero. The presence of chloramines is not desired because of the distinctive 'swimming pool' smell caused by

combined chlorines like di-chloramines. Beside this unpleasant odor, chloramines can irritate the eyes and the mucous membranes.

Commercial chlorine for disinfection may be available as a gas (Cl_2), a liquid like sodium hypochlorite or bleach (NaOCl) or in a solid state like calcium hypochlorite, chloro-hydrantoin or chloro-cyanuric acid compounds. These compounds, once dissolved in water do establish equilibrium between the hypochlorous acid (HOCl) and the hypochlorite ions (OCl^-). Although both forms are considered free chlorine, it is the hypochlorous acid that provides the strongest disinfecting and oxidising characteristic of chlorine solutions; the amount of hypochlorous acid in chlorinated water depends upon the pH value of the solution. Changes in pH value will affect the HOCl equilibrium in relation to the hydrogen and hypochlorite ion; HOCl decreases and OCl^- increases as pH increases. At a low pH, almost all the free chlorine is in the molecular form HOCl and at a pH of around 7.5, the ratio between HOCl and OCl^- is 50:50. Since the ionic form OCl^- is a slow acting sanitizer while the molecular HOCl is a fast acting, it is important to regularly measure the pH. As a general rule a pH of about 7.2 is recommended to maintain fast acting disinfection conditions.

Chlorine, pH, ORP and Temperature Analyzers

- Backlit LCD display
- Nema 4X protection
- DPD chlorine measurement method
- Colorimeter diagnostics
- Reagent reminder
- Amplified pH/temperature probe
- Data logging of up to 3500 measurements
- GLP data for review of calibration information
- Digital RS485 output
- Two analog outputs for recording or dosing devices (PCA340)
- Two dosing relays
- SPDT alarm relay
- SPDT system error relay
- Warning messages



The PCA family are process analyzers for the continuous measurement of chlorine, pH (PCA320, PCA330, PCA340) and temperature. These analyzers feature built-in data logging, RS485 digital output, dosing relays, and alarm relays packaged in a wall-mount Nema 4x enclosure. The PCA340 also features two analog outputs.

This family uses the DPD Colorimetric method in which N, N-Diethyl-p-phenylenediamine indicator and a buffer are mixed together with the sample. The resulting chemical reaction causes a magenta color to form in the presence of chlorine. The color intensity is proportional to the concentration. The color intensity is measured photometrically (light source at a specific wavelength and a photodetector) and converted to chlorine concentration, in mg/L, which is displayed on the front panel. The sampling interval for

chlorine measurement is adjustable from 3 to 90 minutes. These analyzers have a dosing relay for the addition of chlorine by a dosing pump or chlorine generator when a reading is below the programmable set point. The technology used by this family for chlorine measurement is the same as that found in portable and benchtop colorimeters providing for consistent results when performing process verification with one of those types of meters.

The PCA320, PCA330 and PCA340 also utilize the HI1005 amplified pH electrode with a built-in pt100 temperature sensor and matching pin to measure both pH and temperature. The built-in amplifier and matching pin provide for exceptional performance against any electrical noise generated by pumps and motors. These analyzers have a programmable dosing relay for the adjustment of pH. The

dosing relay can be activated by either on/off or proportional control.

The PCA340 features two selectable 0-20 or 4-20 mA signal output that are scalable for the transmission of readings to external recording devices. The analog outputs can also be set for dosing and used with dosing pumps that accept a 4-20 mA analog input. The analog outputs can be used for any of the three measured parameters.

Through the system setup menu, users have the ability to enable or disable the low and high level of alarms for all parameters. The PCA family also offers overdosing protection that generates an alarm if something within the system is not working properly. The system will stop processes until the user corrects the error.



Backlit LCD Display

The PCA family has a backlit display that is easy to read from a distance and allows for up to three parameters to be displayed at a time.



Nema 4X Protection

These analyzers are enclosed in waterproof casing for superior protection against the elements. The front door of the case has a window for the measurement display while also shielding the DPD reagents from UV light to prevent premature degradation.

DPD Chlorine Measurement Method

The DPD colorimetric method is one of the most common and reliable methods to measure chlorine. The PCA family can use either free or total chlorine reagents and allow for 16,000 measurements to be performed.

Reagent Reminder

The PCA family has a reagent reminder feature to alert the user when the reagents are running low. When the reagents are changed the counter is reset and the meter automatically tracks the number of readings performed.

Colorimeter Diagnostics

Advanced diagnostics allow for easy troubleshooting of the colorimeter. In the setup menu it is possible to select an option that allows the user to determine the difference between a dark read (LED off) and a blank read (LED on). These analyzers also automatically perform this check in order to determine when to alert the user that the sample cell needs to be cleaned.

Amplified pH/Temperature Probe (PCA320, PCA330, PCA340)

An integrated pt100 temperature sensor allows for automatic temperature compensation of pH measurements and allows for monitoring temperature as well. The built in amplifier and matching pin provides for exceptional performance where other probes fail when placed in line with pumps and motors.

Data Logging

The analyzers can store up to 3500 readings (at least 7 days worth of records when set to a 3 minutes sampling interval) that can be reviewed or downloaded to a Windows compatible PC using the HI92500 software and the RS485 serial port. Logged records contain the date time and reading of all parameters measured along with any alarm status.

GLP Data

The GLP data allows for the user to review the data and time for the last Chlorine and pH calibration.

Digital RS485 Output

These analyzers have a RS485 digital output that allows for connection to a Windows compatible PC running the HI92500 software. The software allows for remote monitoring, review of logged data, events and errors, and executing setup options.

Two Analog Outputs (PCA340)

The PCA340 features two selectable 0-20 or 4-20 mA signal output that are scalable for the transmission of readings to external recording devices. The analog outputs can also be set for dosing and used with dosing pumps that accept a 4-20 mA analog input. The analog outputs can be used for any of the three measured parameters.

Two Dosing Relays

The dosing relays of these analyzers can be connected to a pH and/or chlorine dosing pumps. The chlorine relays are proportionally controlled while the pH relay can be set for on/off or proportional control. The proportional control offers very fine control of dosing to prevent any overshoot and wastage of chemicals.

Alarm Relay

One SPDT alarm relay is provided that can be activated by adjustable upper and lower chlorine, pH and temperature limits.



Error Relay

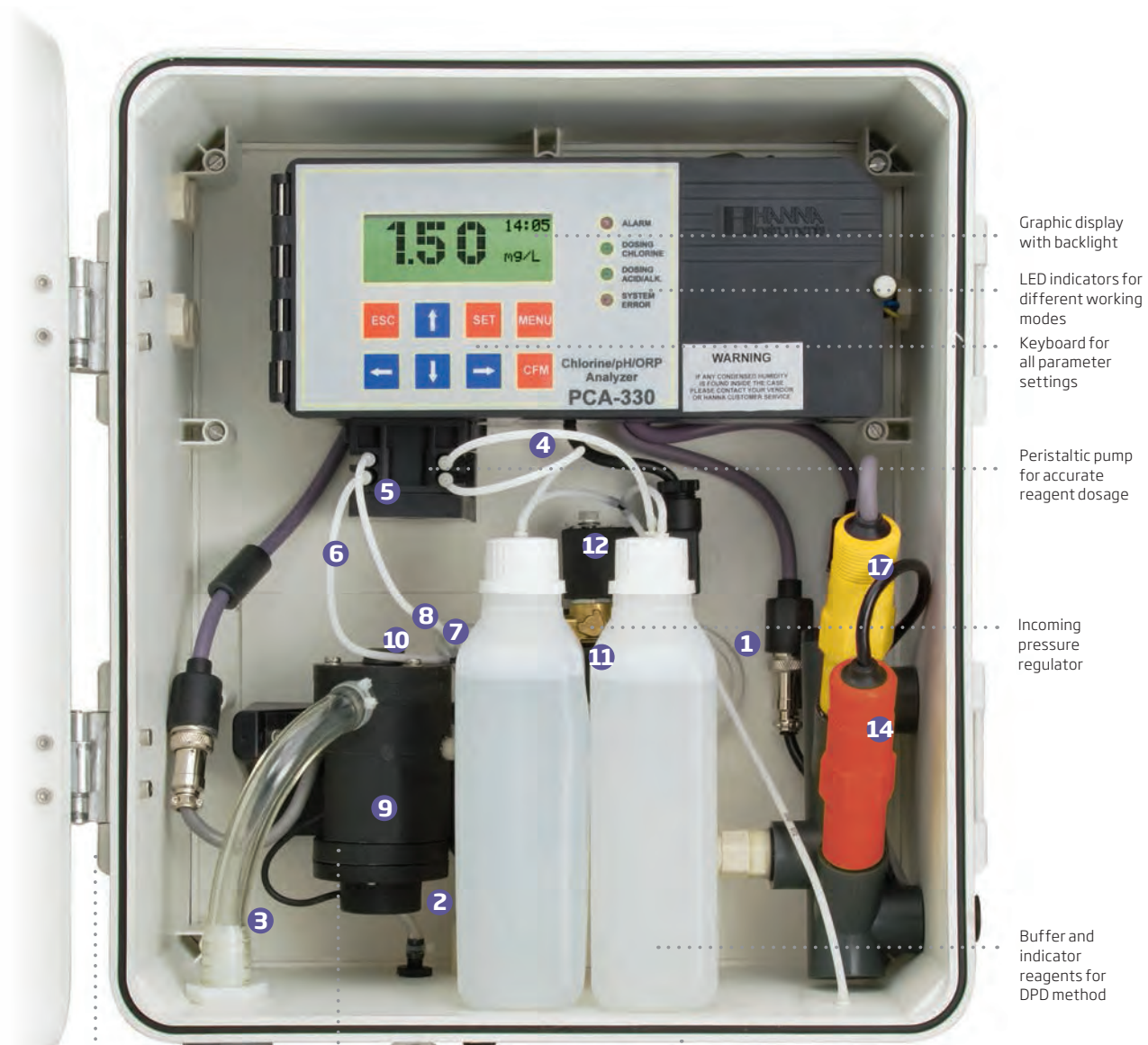
One SPDT error relay is provided and is activated when an error is present including a problem with the colorimeter such as when the reagent counter has reached zero, or when a reading is outside the range for a measured parameter.

Warning Messages

Error messages are displayed when the reagents are expired or low and if the colorimeter cell needs to be cleaned.

Specifications	PCA310	PCA320	PCA330	PCA340	
Free and Total Chlorine	Range	0.00 to 5.00 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)
	Resolution	0.01 mg/L (ppm)	0.01 mg/L (ppm)	0.01 mg/L (ppm)	0.01 mg/L (ppm)
	Accuracy	± 8% or ±0.05 mg/L whichever is greater	± 8% or ±0.05 mg/L whichever is greater	± 8% or ±0.05 mg/L whichever is greater	± 8% or ±0.05 mg/L whichever is greater
	Calibration	one-point process calibration			
	Minimum Detectable Level	0.05 mg/L			
	Sampling Rate	adjustable from 3 to 90 minutes			
	Dosage	proportional relay or 4-20 mA output			
	Delta (Δ)	selectable from 0.1 to 5 mg/L (ppm)			
pH	Range	-	0.00 to 14.00 pH	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	-	0.01 pH	0.01 pH	0.01 pH
	Accuracy	-	±0.05 pH	±0.05 pH	±0.05 pH
	Calibration	-	one or two points or in line calibration		
	Dosing Rate	-	adjustable from 3 to 120 seconds		
	Dosage	-	ON/OFF or proportional, relay or 4-20mA output		
	Delta (Δ)	-	selectable from 0.10 to 2.00 pH		
	Hysteresis	-	selectable from 0.05 to 2.00 pH		
ORP	Range	-	-	0 to 2000 mV	-
	Resolution	-	-	1 mV	-
	Accuracy	-	-	±1 mV	-
Temperature	Range	-	5.0 to 75.0°C (41.0 to 167.0°F)	5.0 to 75.0°C (41.0 to 167.0°F)	5.0 to 75.0°C (41.0 to 167.0°F)
	Resolution	-	0.1 °C (0.1°F)	0.1 °C (0.1°F)	0.1 °C (0.1°F)
	Accuracy	-	±0.5°C (±1.0°F)	±0.5°C (±1.0°F)	±0.5°C (±1.0°F)
Additional Specifications	Analog Output (Dosing)	(1) 4-20mA			(2) 4-20mA
	Recorder Output	(1) 0-10 mV, 0-100 mV, 0-1 V, 4-20mA			(2) 4-20mA
	PC Connectivity	RS485 port, galvanically isolated			
	Baud Rate	1200, 2400, 4800, 9600 bps			
	Data Logging	up to 3500 data points			
	GSM Alarm	2 numbers, alarm SMS, info SMS, warning SMS			
	Alarm Relay	SPDT contact with 5A, 230V resistive load			
	Dosing Relay	SPDT contact with 5A, 230V resistive load			
	System Error	SPDT contact with 5A, 230V resistive load			
	Sample Inlet Pressure	0.07 to 4 bar with no external pressure regulator (for pressure exceeding four bar an external pressure regulator is required)			
	Sample Flow	100 to 300 mL/min			
	Sample Temperature	5 to 40°C (41 to 104°F)			
	Sample Inlet/Outlet Connection	12mm (1/2") male NPT fitting			
	Drain Connection	10mm (3/8") barb			
	Power Supply	115 VAC ±10% or 230 VAC ±10%; 50/60 Hz; 20 VA			
	Enclosure	NEMA-4X standard, molded fiberglass polyester with transparent Lexan window			
	Dimensions / Weight	318 x 267 x 159 mm (12.5 x 10.5 x 6.25") / 5 kg (11 lb.) without reagents			
Ordering Information	Each PCA300 series model is supplied with reagent bottles (2), reagent caps (2), 1 DPD compound powder, tubing and instructions.;				
	PCA310-1 Free & total chlorine analyzer/control (115V); PCA310-2 Free & total chlorine analyzer/control (230V);	PCA320-1 Free & total chlorine analyzer/control, pH control, temperature (115V); PCA320-2 Free & total chlorine analyzer/control, pH control, temperature (230V);	PCA330-1 Free & total chlorine analyzer/control, pH control, ORP monitoring, temperature (115V); PCA330-2 Free & total chlorine analyzer/control, pH control, ORP monitoring, temperature (230V)	PCA340-1 Free & total chlorine analyzer/control, pH control, temperature with dual analog outputs (115V); PCA340-2 Free & total chlorine analyzer/control, pH control, temperature with dual analog outputs (230V)	
Recommended Probes	HI1005	Flow-thru Monitoring pH electrode			
	HI2008	Flow-thru Monitoring ORP Electrode			

PCA Parts and Solutions



Graphic display with backlight

LED indicators for different working modes

Keyboard for all parameter settings

Peristaltic pump for accurate reagent dosage

Incoming pressure regulator

Buffer and indicator reagents for DPD method

Hinged cover with window for easy maintenance

Measurement cell with LCD light source

Port to quickly drain the measurement cell at the end of the cycle

External enclosure according to NEMA 4X standard for best protection



Parts

HI70473	PCA tubing kit, pressure regulator to drain (2). Each kit includes: transparent Tygon tubes 86L x 3.2ID mm (3.4 x 0.1") (Length x Internal Diameter) (1, 2) and 105 x 9.5 mm (4.1 x 0.4") (3)
HI70474	PCA peristaltic pump tubing kit (6). Each kit includes: non-transparent C-flex tubes 55L x 0.8ID mm (2.1 x 0.03") (5)
HI70475	PCA peristaltic pump tubing kit (2). Each kit includes: non-transparent C-flex tubes 55L x 0.8ID mm (2.1 x 0.03") (5)
HI70476	PCA reagent bottle tubing kit (6). Each kit includes: non-transparent C-flex tubes 155L x 0.8ID mm (6.1 x 0.03") (11)
HI70477	PCA tubing set for measuring cell (2). Each set includes: non-transparent C-flex tube 50L x 0.8ID mm (2.0 x 0.03") (8) and Y strainer (7)
HI70478	PCA tubing kit, bottle to pump (6). Each kit includes: non-transparent C-flex tube 150L x 0.8ID mm (5.9 x 0.03") (4)
HI70479	PCA tubing kit, pump to Y strainer (6 pcs). Each kit includes: non-transparent C-flex tube 150L x 0.8ID mm (5.9 x 0.03") (6)
HI70482	PCA filters. The kit includes 0.5 µm and 50 µm filters (13)
HI70495	incoming pressure regulator
HI70496	Replacement filter, 0.5 µm (15)
HI70497	Replacement filter, 50 µm (16)
HI70483	PCA complete tubing kit. The kit includes: non-transparent C-flex tubes (4, 6) 150L x 0.8ID (5.9 x 0.03") (4 pcs), non-transparent C-flex tubes (5) 55L x 0.8ID (2.1 x 0.03") (2 pcs), non-transparent C-flex tubes (8) 50L x 0.8ID (2.0 x 0.03") and Y strainer (7)
HI70484	PCA complete tubing kit (3). Each kit includes: non-transparent C-flex tubes (4, 6) 150L x 0.8ID (5.9 x 0.03") (4 pcs), non-transparent C-flex tubes (5) 55L x 0.8ID (2.1 x 0.03") (2 pcs), non-transparent C-flex tubes (8) 50L x 0.8ID (2.0 x 0.03"), Y strainer (7)
HI70485	PCA stirrer motor
HI70486	PCA stirring bar (2)
HI704871	Measuring cell (9)
HI70488	Electrovalve, 24VAC/60Hz (12)
HI70489	Electrovalve, 24VAC/50Hz (12)
HI70492	Electrode holder (PCA330)
HI70493	Closing cap for electrode holder

Electrodes

HI1005	Amplified pH electrode with Matching Pin and Pt100 (14) (PCA320/330 only)
HI2008	Amplified ORP electrode with Matching Pin (17) (PCA330 only)

Reagent Sets

HI70431	Total Chlorine reagent set for PCA (buffer citrate), 500 mL (2)
HI70481	Total chlorine reagent set for PCA, 500 mL (2) + 5 powder sachets (DPD)
HI70491	Total chlorine reagent set for PCA, 500 mL (2) + 5 powder sachets (DPD)
HI70430	Free chlorine reagents set for PCA (the most stable), recommended for long term measurements, 500 mL (2) + 6 g powder
HI70480	Free chlorine reagents set for PCA, recommended for short term measurements, 500 mL (2) + 5 sachets (DPD)
HI70490	Free chlorine reagents set for PCA, 500 mL (2) + 5 sachets (DPD)
HI70452	DPD reagent, 5 sachets

Solutions

HI70460	Total chlorine indicator solution for PCA, 500 mL*
HI70461	Total chlorine buffer solution for PCA, 500 mL
HI70450	Free chlorine indicator solution for PCA, 500 mL*
HI70451	Free chlorine buffer solution for PCA, 500 mL
HI7004L	pH 4.01 buffer solution, 500 mL
HI7006L	pH 6.86 buffer solution, 500 mL
HI7007L	pH 7.01 buffer solution, 500 mL
HI7009L	pH 9.18 buffer solution, 500 mL
HI7010L	pH 10.01 buffer solution, 500 mL
HI7020L	200-275 mV buffer solution, 500 mL
HI7091L	Pretreatment reducing solution, 500 mL
HI7092L	Pretreatment oxidizing solution, 500 mL
HI70300L	Storage solution, 500 mL
HI7082	3.5M KCL electrolyte, 30 mL
HI7061L	Electrode cleaning solution, 500 mL

Software

HI92500	Windows® compatible software
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* After addition of 5 powder sachets (HI70452-0)

BL120 and BL121

pH/ORP Swimming Pool and Spa Controllers with Built-In Chemical Feed Pumps

The BL120 and BL121 are an all-in-one solution for automatic control of pH and chlorine levels in swimming pool, hot tub, and spa water.

The BL120 and BL121 Swimming Pool Controller is a complete system designed for maintaining swimming pool, hot tub, and spa disinfection water quality. These controllers are available in two configurations. The basic version is the in-line model which allows for direct installation of probe and chemical injection fittings into existing piping. A panel mounted version with a bypass flow cell is also available. The bypass flow cell allows for calibration and maintenance of the probe without having to shut down the recirculation pump.

The BL120 and BL121 use a multiparameter digital HI1036-1802 probe that incorporates pH, ORP, and temperature sensors along with a matching pin. All readings are measured within the probe and the data transferred to the controller by a digital connection. Both a digital connection and matching pin provide for stable, reliable measurements. Without these two components, electrical noise from recirculation pumps and ground loops can interfere, causing erratic readings and premature probe failure.

These controllers have two built-in peristaltic chemical feed pumps that are proportionally controlled with adjustable flow rates. One of the pumps is used to dose acid while the other is used to dose chlorine. The effectiveness of the available chlorine, as determined by ORP, is inversely related to the water's pH value. A pool with a fixed concentration of chlorine

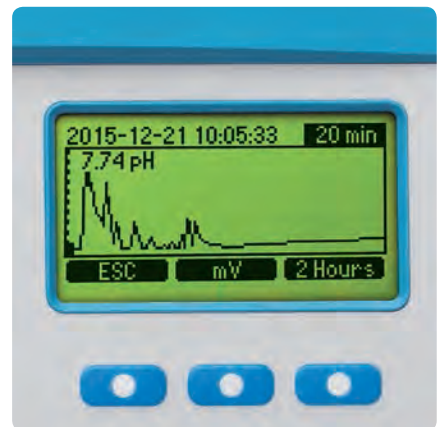
will show a decrease in ORP as the pH of the water increases. The BL120 and BL121 utilize a dosing consent feature that will not dose chlorine until the pH value is first corrected, since it is possible to have a low ORP value even though there is sufficient chlorine. The dosing consent feature will prevent chemical wastage and having a higher chlorine concentration level than desired.

For compliance monitoring, BL120 and BL121 have a built-in datalogger. Measurement readings are logged every 10 seconds with a new log starting for each new day or when the instrument is calibrated. Logged data include pH, ORP, and temperature values, last calibration data, setup configuration, and any event data.

For BL121 models, three 4-20mA analog outputs are available for users that wish to connect to an external chart recorder or datalogger to monitor any of the three measured parameters. The outputs are scalable, offering increased flexibility and better resolution as needed.

Additional features of the BL121 include LED indicators for dosing, meter status and service, real-time graph display, programmable alarms, and password protection.

These controllers are an all-in-one solution for automatic control of pH and chlorine levels in swimming pool, hot tub, and spa water.



Three Display Modes

The versatile display of the BL120 and BL121 allows for three display modes. The LCD can display all three parameters at one time, a 3-second cycle of single parameters, or a real-time plot screen with options for parameter selection, zooming, and log recall.



ORP (Chlorine) Dosing Consent

Both pH and ORP meters are commonly used with swimming pools. With chlorine disinfection there is an inverse relationship between pH and ORP. As the pH level increases, the ORP level decreases. The BL120 and BL121 utilize a dosing consent feature that will not dose chlorine until the pH value is first corrected since it is possible to have a low ORP value even though there is sufficient chlorine. The dosing consent feature prevents wastage of chemicals and avoids a higher than necessary chlorine concentration.

Peristaltic Dosing Pumps

BL120 and BL121 are equipped with two peristaltic dosing pumps with replaceable chemical resistant tubing. A problem that occurs with chlorine dosing pumps is the formation of chlorine gas. When using a diaphragm pump, chlorine gas can collect in the pump head and cause the pump to lose prime; the buildup of chlorine gas is not a problem with peristaltic pumps that use rollers and tubing.

Automatic Proportional Pump Control

BL120 and BL121 feature proportionally controlled dosing pumps. Based on the sensitivity of the process to chemical addition, these controllers allow the user to adjust a proportional band. This setting determines the amount of time that the pumps are dosing as a percentage of the deviation from the set point. For example, a large body of water will use a small proportional band; having a small band (e.g., 0.1 pH) will ensure the pumps are dosing more often when the reading is close to the set point. For smaller bodies of water such as hot tubs or spas, it is more useful to set a larger proportional band (e.g., 1.0 pH); when the reading is close to the set point, the amount of time that the dosing pump is on is minimal to avoid large swings of pH or ORP. This valuable feature allows for very fine control in maintaining the desired set point.

Adjustable Flow Rate

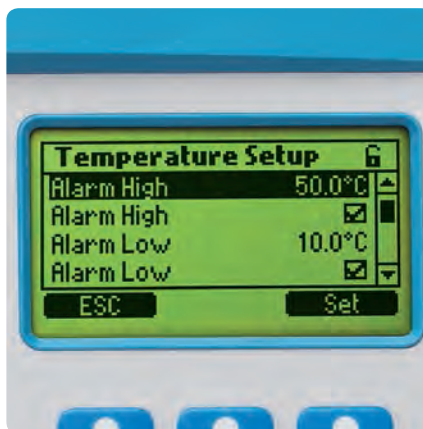
The flow rate from the dosing pumps is adjustable from 0.5 to 3.5L/h. Larger bodies of water require more chemical to be dosed than small bodies since it takes more chemical to see a change in the reading. The adjustable flow rate, like the proportional band, allows for better control in maintaining a desired set point.

Acid and Chlorine Tank Level Inputs

The BL120 and BL121 allow for a connection to an optional level controller. This input is used to disable the dosing pumps when there is no chemical left in the reservoir tank.

Hold Input

It is possible to connect a flow switch mounted in-line or a mechanical relay that is connected to the recirculation pump power source to the hold input of these controllers. With no flow or when no power is applied to the recirculation pump, the hold circuit will disable the dosing pumps. This will prevent any dosing of chemical when there is no movement of water in the system.



Programmable Alarm System

These controllers allow users to enable or disable the low and high level of alarms for all parameters: pH, ORP, and temperature. When an alarm is activated, all dosing will stop. The alarm system also offers overdosing protection in that if the value is not corrected within a specified time interval then the meter will go into alarm status.



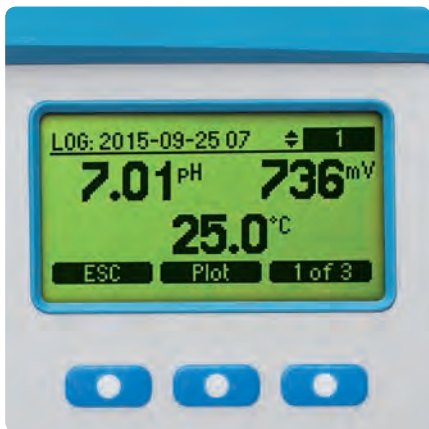
Multicolored LED Indicators

BL120 and BL121 offers multiple LED indicators for status, servicing, and pump operation. The STATUS LED changes color based on operational state; a green LED means the water is within the desired parameter ranges, a yellow LED means that the controller needs attention, and a red LED identifies a problem in the system such as high and low pH, ORP and/or temperature readings. The SERVICE LED indicates any alarms and process errors experienced by the controller.



BL121 Analog Outputs

The BL121 controller offers three 4-20 mA outputs. Each output can be disabled or connected to an external recording device. Each of the three measured parameters (pH, ORP, and temperature) can be assigned to an analog output where the current signal will be proportional to the measured value. For more flexibility and better resolution, the analog output can be scaled; users can define any two points within a parameter range to correspond to the analog output span. For example, the controller assigns 0 pH to 4 mA and 14 pH to 20 mA as a default. The user can adjust the pH range to assign pH 6 to 4 mA and pH 8 to 20 mA. This adjustment allows better resolution in the range of interest.



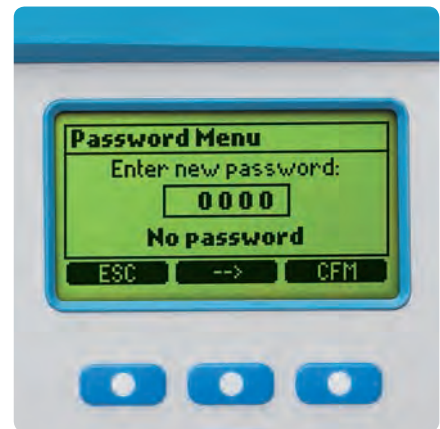
Automatic Logging

The readings for each parameter are automatically logged every 10 seconds. A new log is started each time the instrument is calibrated or at the start of a new day. Logged data include pH, ORP, and temperature values, last calibration data, setup configuration, and any event data.



USB Connectivity

For review and storage the users can easily transfer data to a PC using a flash drive and the USB port.



Password Protected

BL120 and BL121 controllers feature a password protection solution that offers restricted access to calibration, setup, and review of logged data. The password can be set and enabled/disabled during general setup of the instrument.



Multiple Configurations

BL120 and BL121 swimming pool controllers are available in one of two configurations. The basic version is the in-line model which allows for direct installation of the probe and chemical injection fittings into existing piping.

A panel mounted version of these controllers with a bypass flow cell is also available. The bypass flow cell allows for calibration and maintenance of the probe without having to shut down the recirculation pump.

HI1036-1802 Multiparameter Digital pH, ORP, Temperature Probe

The HI1036-1802 is a digital combined probe that measures pH, ORP, and temperature. This probe also incorporates a potential matching pin. The matching pin is considered the "earth ground" connection and is used to prevent ground loop effects from causing erratic readings and damage to the system.

The pH glass has been chosen to produce stable quick equilibration even in low conductivity waters. Additionally, the pH sensor is designed to produce a mV value near pH 4 (not pH 7 like typical pH sensors) should it stop working. A broken pH electrode that produces a mV value near pH 7 would produce an alarm state and disable any pump activated.

The ORP sensing surface is a large smooth surfaced platinum band that encircles the circumference of the temperature probe. It is referenced to Ag/AgCl reference electrode (3.5M KCl).

The ORP and pH sensors and reference electrode use a differential measurement technique which is known to stay in service and provide accurate measurements under adverse conditions that may cause conventional pH probes to produce erroneous measurements. The HI1036-1802 probe with its differential amplifiers greatly reduces inaccuracies caused by ground loops which may exist between process and instrument grounds. With the differential technique, a ground loop current will flow through the low impedance path of the matching pin thus providing immunity to the measurement signals. Additionally the probe converts these measurements to a digital signal to eliminate noise and static due to high impedance signals carried by cable.

The HI1036-1802 with the BL120 or BL121 pool controller helps to promote the health and safety of pool and spa water.



Flow Cell for BL120-20 and BL121-20

Specifications

BL120/BL121

pH	Range	0.00 to 14.00 pH
	Resolution	0.01 pH
	Accuracy (@25°C/77°F)	±0.05 pH
	Calibration	pH buffer calibration: automatic, two-point (4.01, 7.01, 10.01 pH) pH process calibration: one-point, manual input
	pH Dosing	proportional with adjustable set point and proportional band; delay to start at power-on and overdosing protection
mV	Range	±2000 mV
	Resolution	1 mV
	Accuracy (@25°C/77°F)	±5 mV
	ORP (mV) calibration	one-point, manual input
	ORP Dosing	proportional with adjustable set point and proportional band; delay to start at power-on and overdosing protection; pH dosing interlocked
Temperature	Range	-5.0 to 105.0°C (23.0 to 221.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy (@25°C/77°F)	±1°C (±1.8°F)
Additional Specifications	Temperature Compensation	automatic, -5.0 to 105.0°C (23.0 to 221.0°F) for pH
	Pump Control	automatic and manual modes; adjustable flow rate from 0.5 to 3.5 L/h
	Log Feature	automatic logging of pH, ORP, and temperature measurements, GLP and events including alarms, errors and power failure; capacity for 60 days with 10 second sampling interval; all data .csv files are transferred by USB flash drive
	Alarms	high and low with enable/disable option for all parameters; alarm is triggered when 5 consecutive readings are over/under threshold
	Alarm System	intuitive alert system based on LEDs; alarm filtering options; alarm relay control based on user setup
	Password Protection	setup, calibration and log recall options features are password protected
	Storage Interface	USB
	GLP	pH/ORP calibration information including date and time for pH/ORP sensors
	Alarm Relay Output (1)	SPDT 5A/230 VAC; activated by pH/ORP/temperature selectable alarm conditions
	BL121 Analog Outputs (3)	4 to 20 mA, sourcing, configurable; output impedance ≤ 500 Ohm; accuracy < 0.5 % FS; galvanically isolated up to 50 V relative to earth ground
	Auxiliary Inputs (3)	low level in acid/base tank (contact open); low level in chlorine tank (contact open); hold input (contact open)
	Digital Probe Input (1)	galvanic isolated digital input HI1036-1802 pH/ORP/temperature/matching pin combined probe with DIN waterproof connector
	Power Supply	100 – 240 VAC
	Power Consumption	10 VA
	Environment	0 to 50°C (32-122°F); max 95% RH non-condensing
	Dimensions	245 x 188 x 55 mm (73 mm with pumps); 9.6 x 7.4 x 2.2" (2.9" with pumps)
	Weight	1700 g (60 oz.)
Ordering Information	In-Line Configuration	
	BL120-10 pH/ORP/Temperature Pool Controller is supplied with HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.	
	BL121-10 pH/ORP/Temperature Pool Controller with analog output is supplied with HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.	
	User Panel Flow Cell Configuration	
BL120-20 pH/ORP/temperature pool controller with flow cell is supplied with panel mounted flow cell, HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.		
BL121-20 pH/ORP/temperature pool controller with flow cell and analog output is supplied with panel mounted flow cell, HI1036-1802 pH/ORP/temperature digital probe with matching pin, 50 mm probe saddle (1), fitting for probe, chemical injectors (2), 50 mm saddle for injectors (2), peristaltic tubing (2), 5 m of injection tubing, aspiration filter (2), pH 7.01 buffer sachets, 20mL (3), pH 4.01 buffer sachets, 20mL (3), 470 mV test solution sachets (3), power cable and instruction manual.		
Accessories	BL120-200	pool controller aspiration filter
	BL120-201	pool controller injector, 1/2" thread
	BL120-202	aspiration and dispensing tubing (5m)
	BL120-300	pool controller peristaltic pump tubing Kit (2)
	BL120-402	flow cell tubing (5m)
	BL120-163	fittings Kit for 63 mm pipe diameter (saddle for injectors (2), saddle for probe (1))
	BL120-175	fittings Kit for 75 mm pipe diameter (saddle for injectors (2), saddle for probe (1))



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