General Catalog Volume 30

HANNA instruments

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President's Message

January 2016

Dear Valued Customer,

We are always listening to our customers' feedback and suggestions. Your insight is invaluable for improving your existing products, understanding what new products can be designed for your benefit, and most of all strengthening our relationship with you our valued customer. At Hanna, we believe the only way to gain truly in-depth knowledge of your specific needs is to work as a team dialoging about your unique applications.

As the largest family-owned manufacturer of analytical instrumentation in the world, we design, manufacture, supply and support all of our products to provide our customers with unsurpassed value from our competitors struggle to compete with. Our products are manufactured in our European, state-of-the-art ISO 9001:2008 production facility and are CE compliant to EN 61326:2006 Class B Annex A and C.

This catalog is provided as a resource for finding the right product for your application. In addition to the contact information of our offices around the globe so that you may get in touch with your local Hanna Representative and learn more about how we can help you.

Hanna instruments' mission is to be a worldwide leader in quality, value, service and satisfaction. We can assure you that these principles will be evident throughout your Hanna experience.

On behalf of Hanna instruments, thank you for your continued loyalty and support.

Hanna Ricardo
President, Hanna Instruments

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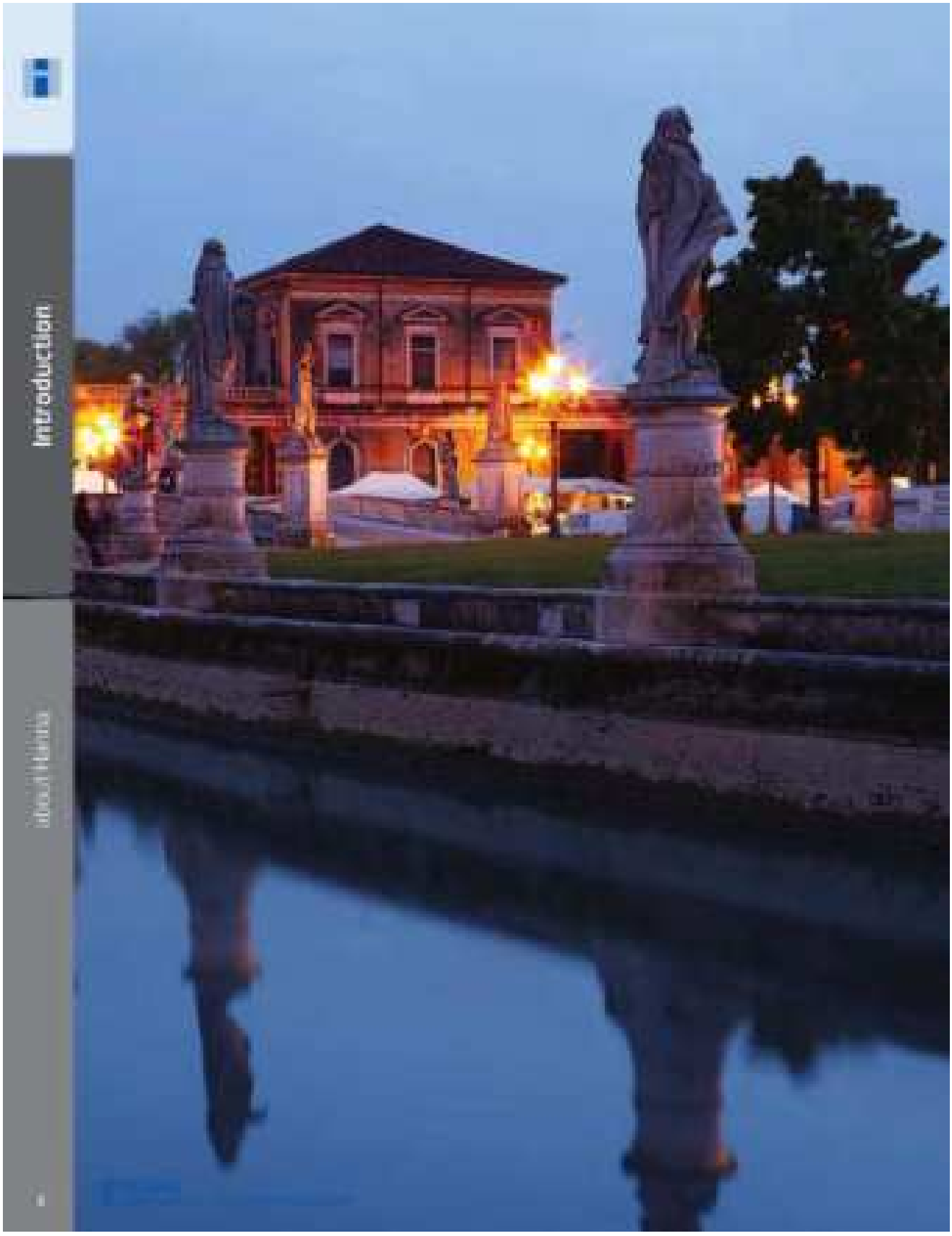


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Introduction

History and Philosophy

History

Philosophy

360° Value

We Design, Manufacture, Supply and Support All of Our Products

A Worldwide Leader

Hanna 360° Value

Quality

Certification

Close to You

Local Support

24/7 Access







Hanna Design and Manufacturing

Production Facilities

Hanna Milestones

Hanna is Technology and Innovation

For over thirty-five years, Hanna has provided itself with large world-leader innovation of analytical instrumentation. Its activity can be more difficult. Hanna's research and development department is constantly challenged to invent new testing techniques and to observe existing technology. The mission of Hanna was to achieve the common goal of simplifying analytical testing through engineering and manufacturing sensor, development, reagents and chemistry.



1978

Hanna Opens in Italy

Hanna was founded in Limena, Italy. Limena is a province of Padua and a Padovan and is located in the Veneto region. It is approximately 40 km east of Venice. Padua is well known for the University of Padua. Many great scholars of our time have spent time at the university. Most notable scholars include Galileo Galilei and Niccolò Copernicus.

1980

World's first single-probe portable conductivity meter

The HI8030 is a two-pole conductivity portable meter. Having a two-pole design allowed the meter to measure a variety of different solutions with different conductivity values. The same meter can be used to measure both deionized water and fertilizer solution.

1982

World's first pH controlled chemical dosing pump

The DP1000 combined a pH meter with a chemical dosing pump in order to maintain a desired set point of a process application. The HI 7510 is the second generation design and is still widely used by many customers in swimming pools, wastewater treatment, water for livestock and cooling tower.

1984

World's first microprocessor-based hand held pH meter

The HI8424 was the first portable microprocessor pH meter. The advanced design allowed for automatic calibration as compared to manual calibration with trimmers or potentiometers. The calibration information was stored in the meter even when it was powered off.

1985

World's first pH electrode with built-in temperature sensor

The HI8314 pH meter was the first meter to use a pH electrode (HI1131B) with a built-in temperature sensor. The temperature sensor allowed for the automatic correction for changes in pH with changes in temperature as calculated by the Nernst equation. This value is now commonplace in the industry.

Hanna Milestones



1986
World's first electronic pocket sized pH tester

1988
World's first pre-amplified pH electrode

1990
World's first waterproof portable pH meter

1991
World's first replaceable electrode pH pocket tester

1992
World's first portable pH meter with plain-paper printer

1995
World's first pocket thermometer with CAL Check™

1997
World's first pH tester with double junction electrode

Introduction

About Hanna

Hanna Milestones



1999

World's first pH/temperature tester with dual-level LCD

2000

World's first multiparameter (pH/conductivity/ temperature) pocket tester

2002

World's first colorimeter with CAL Check™ feature

2003

World's first pH meter with CAL Check™

2004

World's first process pH meter with integrated cellular communication

Hanna Milestones



2004

World's first pH/ORP combo tester

2005

World's first single parameter line of auto titrators for wine testing

2010

World's first handheld colorimeters (Checker®HC series) to offer ease of use and high accuracy in a palm sized design

2013

World's most innovative pH, EC and DO handheld/portable/wall-mount meter...edge®

2014

"World's first pH electrode with Bluetooth® Smart technology (HALO™)

2015

World's first pH electrode and meter with Bluetooth® Smart technology (HALO™ and edge®blu)

Hanna World Headquarters



HEADQUARTERS

HANNA INSTRUMENTS, INC.

Hanna Offices Worldwide

ARGENTINA

AUSTRALIA

BELGIUM

BOLIVIA

BRAZIL

CANADA

CHILE

CHINA

COLOMBIA

COSTA RICA

CROATIA

CZECH REPUBLIC

ECUADOR

FRANCE

GERMANY

GREECE

GUATEMALA

HUNGARY

Hanna Offices Worldwide

INDIA

INDONESIA

ITALY

JAPAN

KOREA

LITHUANIA

MALAYSIA

MEXICO

MOROCCO

THE NETHERLANDS

PANAMA

POLAND

PORTUGAL

ROMANIA

SINGAPORE

SLOVENIA

SOUTH AFRICA

SPAIN

Hanna Offices Worldwide

SWEDEN

SWITZERLAND

TAIWAN

THAILAND

UNITED ARAB EMIRATES

UNITED KINGDOM

UNITED STATES

VIETNAM



edge blu

First pH meter in the world with a Bluetooth® Smart pH electrode


Introduction


HALO
pH electrodes with Bluetooth®
Wireless Technology
Introduction
The world's first
pH electrode with
Bluetooth® Smart
technology

Five Models Available



All readings are transmitted directly to an iPhone® or iPad® (not included) running the Hanna Lab App.

Introduction

Professional Waterproof Meter

for Ultrapure Water



Designed for Water Professionals





pH / Temperature Meter for Milk

with Application Specific Probe





pH / Temperature Meter for Yogurt

with Application Specific Probe



pH / Temperature Meter for Cheese

with Application Specific Probe

New Stirrers and New Colors



Compact Magnetic Mini-Stirrers

11 colors to choose from



Compact Magnetic Mini-Stirrers

with Electrode Holder

11 colors to choose from





GroPro™ pH Tester

Digital Thermometer

with Weighted Stainless Steel Probe Attached to a 9.8' Silicone Cable





GroPro™ pH / EC / TDS / Temperature Meter

with Multiparameter Probe

Measure nutrient solutions with one probe

Calibrate pH and EC with one solution



Checker HC

Maple Syrup Digital Grader

Handheld Colorimeter



Ultra Low Range Free Chlorine

Handheld Colorimeter

Iron Low Range

Handheld Colorimeter

Seawater Alkalinity

Handheld Colorimeter

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Introduction



Laboratory Accuracy in the Field

Conductivity Testers

pH Testers

Salt and Water Purity Testers

Thermometers

Hanna Monitors



pH Monitors

Conductivity Monitors

ORP Monitors

Temperature Monitors

1

Testers and Monitors

Product Spotlights

pH/Conductivity/TDS Testers

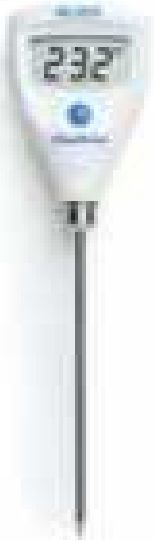


Checker®Plus pH Tester



Soil Test™ Direct Soil EC Tester





Digital Thermometer



Digital Thermometer

with Stainless Steel Probe Attached to a 3.3' Silicone Cable

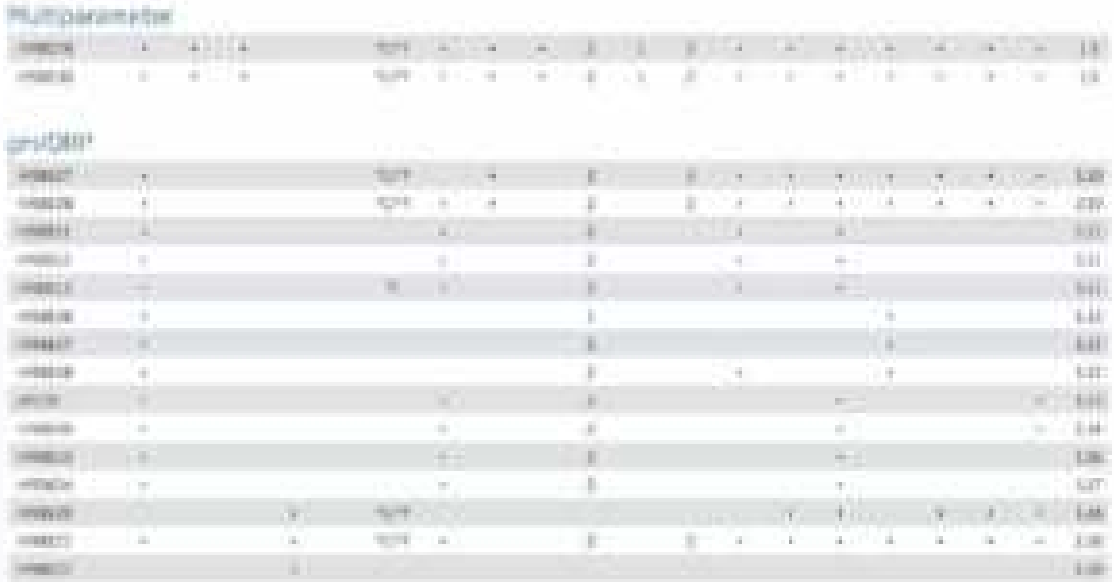


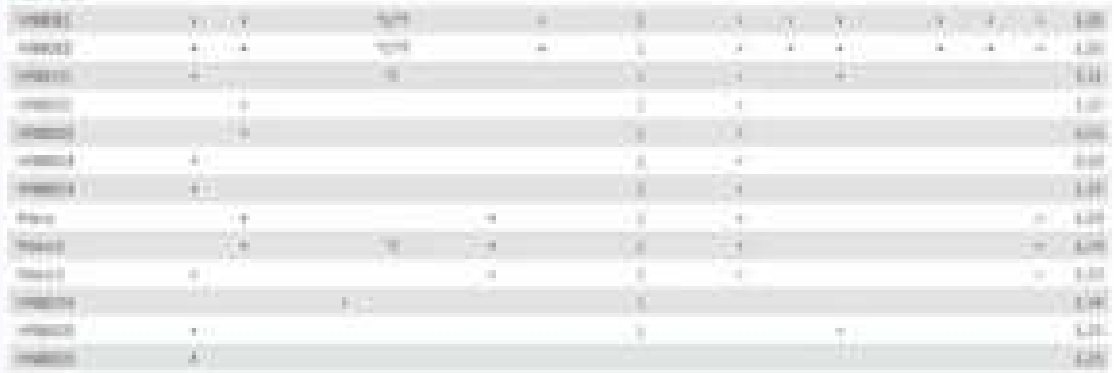
Digital Thermometer

with Weighted Stainless Steel Probe Attached to a 9.8' Silicone Cable

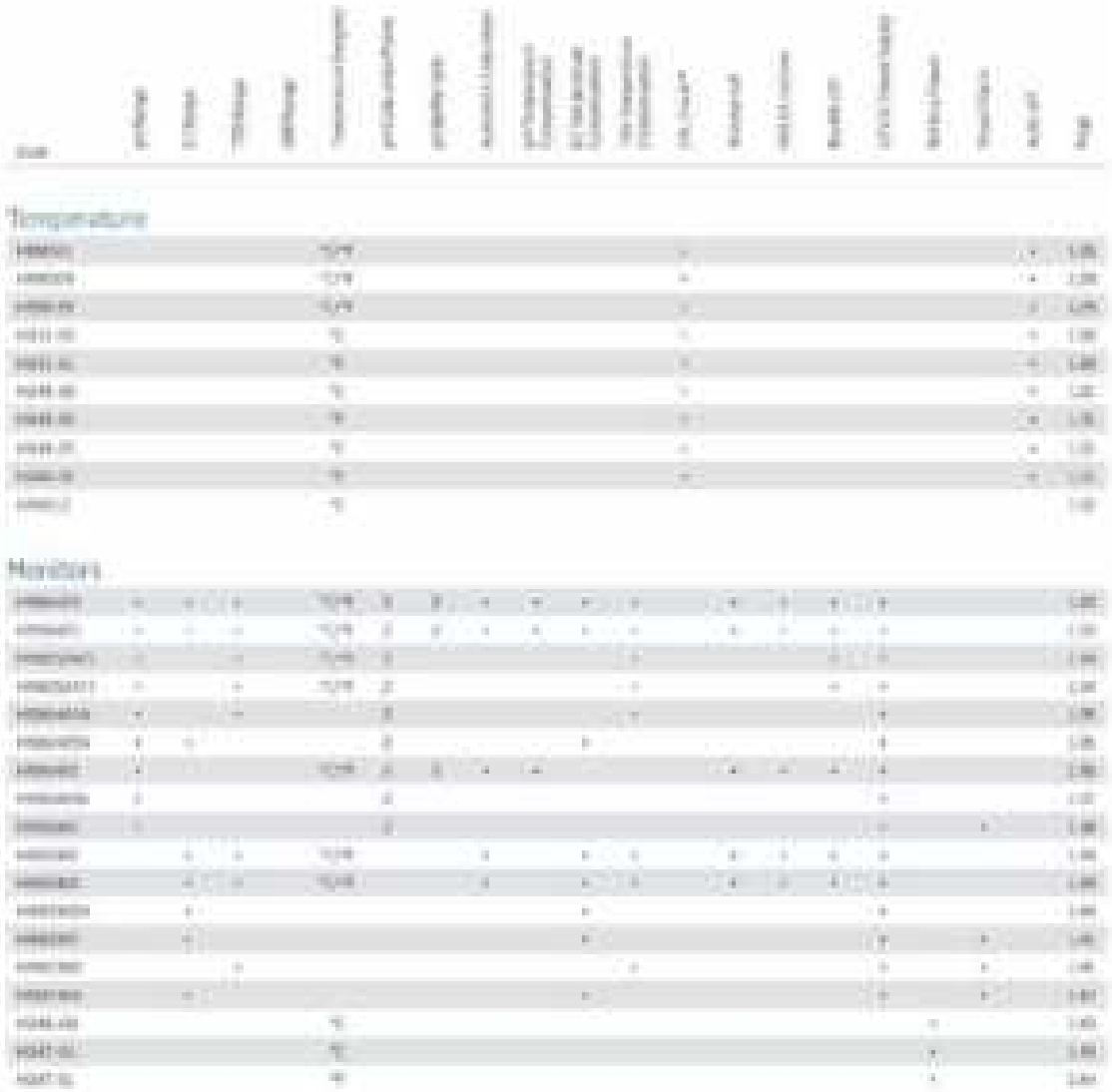
Comparison Guides







Comparison Guides



1

Testers and Monitors

pH/EC/TDS Testers











LCD Display Features

















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pH and Temperature Testers







Stick pH Tester

- Pre-amplified electrode
- Rugged, replaceable probe
- Easy to store and maintain

PICCOLO® is a waterproof, pH tester with a 4 in. pre-amplified electrode.

Conventional pH meters are quickly close to the weak, high impedance signal which makes the meter susceptible to noise, humidity and dirty environments. PICCOLO® has overcome these problems with a pre-amplified electrode that delivers a strong signal to the meter. The electrode connects to the meter via a rugged and flexible pH sensor, reference system, temperature sensor and the entire meter.

PICCOLO® with a 4 in. (12.7 cm) electrode (HI1292).

PICCOLO® 2 with a 6 in. (15.2 cm) electrode (HI1292).

PICCOLO® plus with a 4 in. (10.16 cm) electrode (HI1292) and temperature readout on LCD.

		HI98121 (PICCOLO®)	HI98122 (PICCOLO® 2)	HI98128 (PICCOLO® plus)
pH	Range	-2.00 to 16.00 pH	-2.00 to 16.00 pH	-2.00 to 16.00 pH 0.0 to 100.0°C
	Resolution	0.01 pH	0.01 pH	0.01 pH, 0.1°C
	Accuracy (@20°C/68°F)	±0.05 pH	±0.05 pH	±0.05 pH, ±1°C
additional Specifications	Probe Type	HI1292	HI1292	HI1292
	Calibration	Automatic, two points	Automatic, two points	Manual, two points
	Temperature Compensation	Automatic, from 0°C to 50°C (32 to 122°F)		
	Battery Type / Life	1.5V (3) alkaline batteries (AAA) / approx. 200 hours of continuous use		
	Environment	0 to 50°C (32 to 122°F); RH max 95%		
	Dimensions (meter only)	7.8 x 3.5 x 2.5 cm (3.1 x 1.4 x 1.0")	8.8 x 3.5 x 2.5 cm (3.5 x 1.4 x 1.0")	7.8 x 3.5 x 2.5 cm (3.1 x 1.4 x 1.0")
	Weight	75g (2.7 oz.)		
Ordering Information	All PICCOLO® models are supplied complete with pH probe, stand, pH 4.01 and 7.01 buffer sachets, instructions, carrying case and lanyard.			
	HI98121 PICCOLO® is supplied with HI1292 pre-amplified pH electrode			
	HI98122 PICCOLO® 2 is supplied with HI1292 pre-amplified pH electrode			
	HI98128 PICCOLO® plus is supplied with HI1292 pre-amplified pH electrode with temperature sensor			

1

Testers and Monitors

testers

pHep pH Tester











GroPro™ pH Tester

		pH120
pH	Range	
	Resolution	0.01 pH
	Accuracy (@25°C/77°F)	±0.02 pH
Additional Specifications	Calibration	
	Electrode	
	Battery Type / Life	
	Auto-Off	
	Environment	
	Dimensions	
	Weight	
Ordering Information		


Over 1 million users
since its introduction

Checker® Plus pH Tester









Checker® pH Tester









Education pH Tester

pH/ORP and ORP Testers







ORP Tester



1

Testers and Monitors

EC/TDS and Temperature Testers







Soil Test™ Direct Soil EC Tester

EC and TDS Testers









EC/TDS Testers



Salt Content Meter





Water Purity Testers

	Range		
	Resolution		
	Accuracy		
	Calibration		
	Battery Type/Life		

1

Testers and Monitors

Digital Thermometer

with Stainless Steel Penetration Probe




23.2°C


CAL
-0-






21.6°
70.8.

1

Testers and Monitors

Digital Thermometer

with Stainless Steel Probe Attached to a 3.3' Silicone Cable







Digital Thermometer

with Weighted Stainless Steel Probe Attached to a 9.5' Silicone Cable







Folding Pocket Thermometer







T-Shaped Thermometer



1

Testers and Monitors

KEY® Pocket Thermometer



4 probes available

penetration/general purpose

liquid/general purpose

surface



pH/EC/TDS and Temperature Monitors

- [illegible]
- [illegible]
- [illegible]

[illegible]

At start-up, these instruments perform a self-check to ensure proper working condition. The meeting indicator and HOLD function let the user know when to take readings and if needed the reading on display for easy and accurate data recording.

These instruments are supplied with a non-clogging double junction pH electrode, as well as a rugged conductivity probe that withstands even the most aggressive environments. The GroW1 adapter makes these instruments ideal for all [illegible]

pH	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
EC	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
TDS	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
Temperature	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
Additional Specifications	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
Ordering Information	[illegible]		

[illegible]

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pH/TDS and Temperature Monitor





pH/TDS or pH/EC Continuous Indicators

- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

Specifications			
pH	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy @25°C (77°F)	[illegible]	[illegible]
EC	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy @25°C (77°F)	[illegible]	[illegible]
TDS	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy @25°C (77°F)	[illegible]	[illegible]
Calibration	Calibration	[illegible]	[illegible]
Temperature Compensation	Temperature Compensation	[illegible]	[illegible]
GLP (Good Laboratory Practice)	GLP (Good Laboratory Practice)	[illegible]	[illegible]
Probes	Probes	[illegible]	[illegible]
Power Supply	Power Supply	[illegible]	[illegible]
Environment	Environment	[illegible]	[illegible]
Dimensions	Dimensions	[illegible]	[illegible]
Weight	Weight	[illegible]	[illegible]
Ordering Information		[illegible]	[illegible]

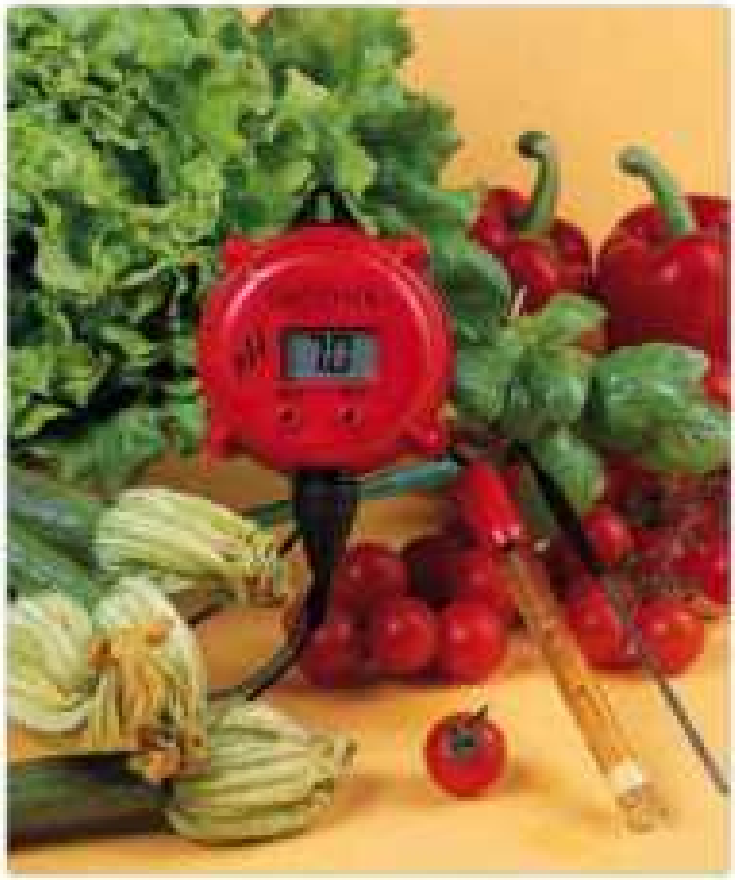
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pH and Temperature Monitor

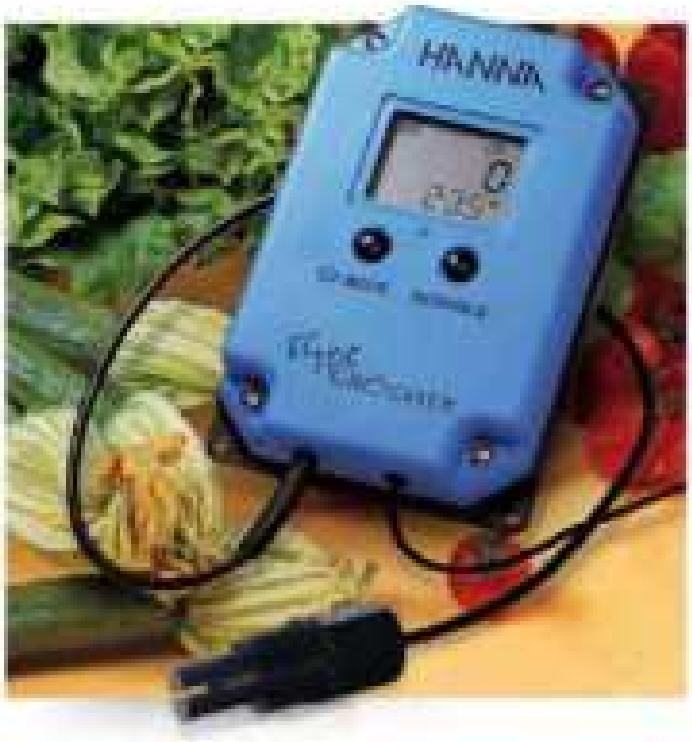




pH Monitor

pH Monitor





EC/TDS and Temperature Monitors

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EC	[illegible]	[illegible]	[illegible]
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	[illegible]	[illegible]	[illegible]
TDS	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
Temperature	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
Additional Specifications	[illegible]	[illegible]	[illegible]
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Ordering Information	[illegible]	[illegible]	[illegible]

EC Meter





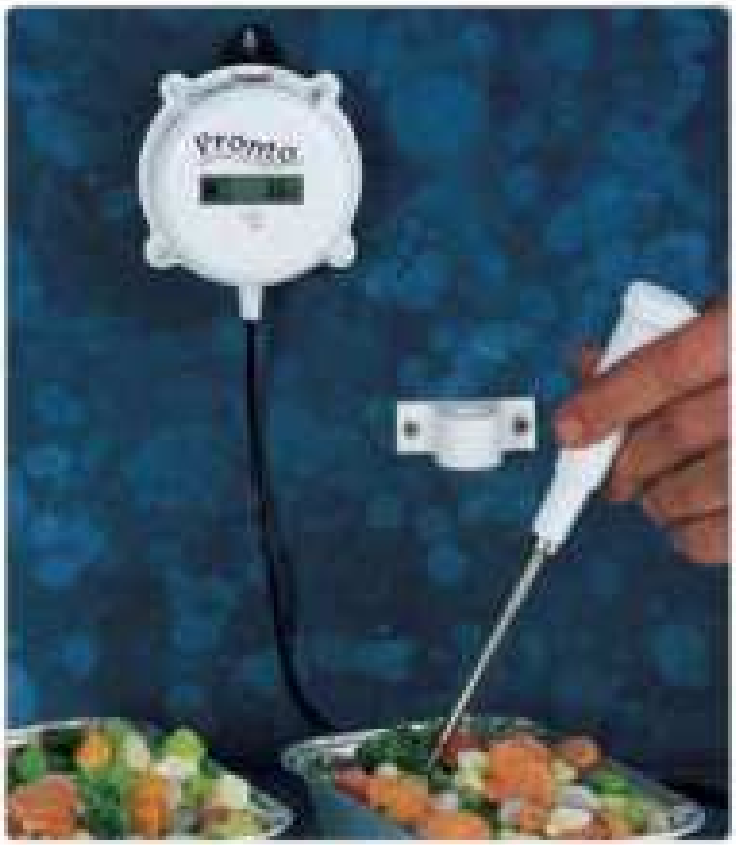
EC/TDS Meters

1

Testers and Monitors

Conductivity Meter for Demineralized Water





Wall-Mounted Precision Thermometer

Checkfridge® Remote Sensor Thermometer





Replacement Electrodes



Replacement Electrodes



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edge® blu

HALO™ Family

edge® pH

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2

Introduction

pH

Single or Multiparameter Instrumentation

Hanna instruments offers both single-parameter and multi-purpose instruments in order to meet a variety of testing requirements.

Using Single Parameter

Hanna single parameter instruments offer simple, on-point and affordable measurement focused on, as the name implies, a single parameter. They are well suited for routine testing where one parameter must be tested quickly and easily. They are generally simple to operate and can be used by even non-technical users.

Using Multiparameter

The advantage of a multiparameter instrument is that users can choose a single meter with the ability to measure multiple parameters.

Multiparameter instruments offer different operating options well suited for meeting multiple requirements and are available in two primary configurations:

1. Multiparameter meters that can measure just one primary parameter, but only one parameter at a time.
2. Multiparameter meters that can measure two or three parameters concurrently, usually in applications in labs and research applications, where the influence between the parameters or ease of use factor. Multiple inputs provide the possibility for simultaneous measurement.

pH Measurement Input

Hanna meters generally come in two different electrode connection types: BNC or DIN.

BNC Connector: A BNC (Bayonet Neill-Concelman) is a common connector used for coaxial cable devices. A BNC connector is generally used for rod-style electrodes and half-cell electrodes that require a separate reference electrode and solution reference (salt bridge).

DIN Connector: A DIN (German Institute for Normung) is a circular connector. It is used to connect amplified pH electrodes. The 5-mini offering a DIN connector features a built-in temperature sensor.

Temperature Input

Temperature has an effect on pH measurements. As such, temperature compensation is required for any pH measurements. Temperature compensation can be achieved in three ways:

1. A separate probe specifically for measuring temperature
2. A probe with a temperature sensor built-in
3. Manual adjustment for temperature

If a temperature input is not present, many instruments still offer the ability to manually adjust for temperature according to any external temperature reference.

pH Temperature Compensation

pH readings must be temperature compensated in order to obtain accurate results. The source of temperature measurement can be from a temperature sensor from a probe that is manually adjusted. In either case, the instrument is adjusting the pH reading to compensate for changes in the pH slope. Temperature compensation provides the actual pH at the known temperature of measurement.

mV Reading

Some meters with pH in its name offer the ability to read the millivolt potential from a pH ISE or ORP electrode. The positive and (down the road) different voltage from various ions.

pH/ISE Calibration

pH calibration should be performed daily or every time a new set of readings is started. Any errors during calibration will affect all the readings and every calibration performed. Always during the calibration process to be sure that all standard calibration procedures are followed.

Hanna recommends the following standard calibration procedure:

1. Clean and prepare the electrode before the calibration.
2. Use fresh pH buffers and standards.
3. Rinse the electrode with purified water during the calibration points to avoid buffer contamination from a dissimilar buffer solution.
4. Wait for a stable reading before the calibration point is confirmed.
5. Temperature compensation of pH reading and pH buffers.

Calibration is a key component to ensuring accurate readings during pH measurement. With this in mind, Hanna supplies each of our pH instruments with a custom package of calibration solutions.

pH CAL Check™

Many instruments feature the pH CAL Check™ technology. CAL Check™ is a diagnostic system that ensures accurate readings every time. By alerting users to potential problems during the calibration process, the CAL Check™ system eliminates erroneous readings due to dirty or faulty pH electrodes or contaminated pH buffer solutions during calibration.

During the calibration process, users are prompted with a step-by-step, on-screen tutorial. After calibration, the electrode is evaluated and the conditions and response time is provided. Each reading can even be recalled with GLP information.

Calibration Errors

Instruments utilizing the pH CAL Check™ technology can evaluate an electrode during calibration and store a history of parameters that describe the quality of the electrode to be compared from one calibration to another. During calibration, every small degradation of the pH electrode is noticed and corrected properly. Any change in the pH electrode's slope, offset, or response time, such as a dirty or worn electrode, is detected during calibration and the user is alerted with a warning message.

pH Buffer Contamination

pH buffers can be contaminated during the calibration procedure by numerous factors such as introducing contaminated probes using old buffers, or by reusing buffers. These factors may cause inaccurate calibration and subsequent measurements.

Hanna's CAL Check™ can inform users of issues during calibration, giving warning messages to inform users about the identified issue.

Response Time of Electrodes

Offset and Slope of pH Electrodes

Calibration Points and pH Buffers

Custom pH Buffers

Stability During Calibration

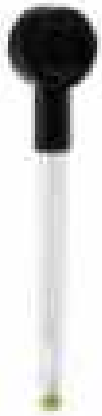
Out of Calibration Range

Calibration Reminder

Step-by-Step Calibration

Additional Features

HALO
and Hanna Lab App



edge®



Research Grade pH Benchtop Meters



Laboratory Grade pH Benchtop Meters

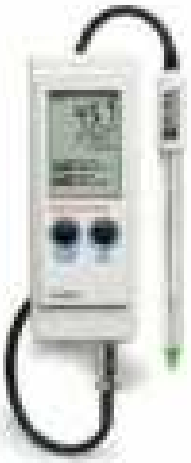


Comparison Guides

Waterproof Portable pH Meters



Application Specific Portable Meters



Other Portable Meters



edge blu



First pH meter in the world with a Bluetooth® Smart pH electrode

edge®blu technical features













edge®blu design features











edge®blu additional features

- Ultimate Drop Guard® liquid technology
- Recalibration reminder from 0.01 and 0.001 pH
- Range -2.000 to 20.000 pH
- Accuracy ±0.002 pH for 0.001 pH resolution (±0.01 for 0.01 resolution)
- Data logging
  - Manual log on demand
  - Manual log on stability
  - Interval logging
- Temperature reading (°C or °F)
- Automatic Temperature Compensation (ATC)
- CAL Check™ reminders
  - Probe condition
  - Response time
  - Check buffer
  - Clean electrode
- GLP data
  - Stored: date, time, offset, slope, and buffers used during calibration
- Free guided calibration
  - A choice of seven pre-programmed buffers plus two custom buffers
- Calibration tag reminders
  - Identifies buffers used for current calibration
- Calibration expiration warning
- Basic mode
  - Turn on the edge to Basic Mode, ideal for routine measurements by displaying a simplified screen and features

4.0 | 0 | 0.5 | 8.8 | 8 | 5.5 | 2

A hybrid meter that can be used in portable, wall-mount, and bench-top configurations











HI11102 HALO™ pH electrode with Bluetooth® Smart technology

Hanna Lab App

pH Meter Application for use with Hanna pH electrode with Bluetooth® Smart technology





HALO®





Connect to the Hanna Lab App



One press connect



Status indicator

The world's first pH electrode with Bluetooth® Smart technology

HALO features



Easy to replace battery



HALO

General Purpose Glass Formulation

Spheric Glass Tip

Built-In Temperature Sensor

Glass Body

Single Ceramic Double Junction Reference





HALO

General Purpose Glass Formulation

Spherical Glass Tip

Built-in Temperature Sensor

PEI Body

Single Ceramic, Double Junction Reference

HALO



Low Temperature Glass Formulation

Spherical Glass Tip

Built-in Temperature Sensor

PVDF Body

Open Junction Reference



HALO

General Purpose Glass Formulation

Spherical Glass Tip

CPS Sleeve Junction

Double Junction Reference

Ag Module

Glass Electrode Body

2

pH

HALO™

Hanna Lab App

pH Meter Application for use with HALO™



Hanna Lab App – Free from the App Store℠

- Connects to HALO™ via Bluetooth® 4.0
- Up to five points pH calibration with custom standard or buffer available
- Custom memorable
  - Add custom calibration to HALO electrode
- Real-time data
  - Display captured pH and temperature values in every reading
- Stability
  - Displays data and level of current calibration along with similar offset and out-of-range alarm
- Tutorials
  - Displays data and level of current calibration, probe offset, and warnings along with calibrated buffers and values, temperature and probe between each buffer
- Rapid pH mode grading
- Measurements taken displayed with calculated data in a graph. The graph data may be exported using pinch-to-zoom technology for enhanced viewing
- Notes/research stored
  - Add to each of the measurement the electrode was tested
- One button data logging
  - Pressing the button on the HALO pH probe or the probe icon in the Hanna Lab App will log sample data for easy reference
- Data logging with custom annotations
  - Saved log files may be annotated with measurement specific information
  - Data is automatically saved every hour
- Four ways to save and share data
  - All data can be set to save automatically
  - All data will be stored locally
  - Automatically stored to the cloud
- Share data via email as CSV (comma separated value) format
- Help and tutorials
  - Easily parse results to help explore features of the Hanna Lab App
  - Connect app to HALO
  - Connect HALO information
  - pH tutorial
  - Maintenance tutorial
  - Contact information

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The first app that turns an iPhone® or iPad® into a full-featured pH meter

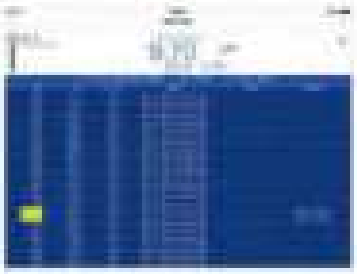
Screen features



Easily accessible help menu



Clear and easily customizable screens



Set alarms to notify you of readings, elements and tests you can have the data you want, when you need it



Share data completely with custom report emails via email

Settings

Tap the gear icon in the top right corner of the measurement screen to access the Probe Settings menu for the following options:

- Measurement
  - Probe password
  - Resolution
  - Temperature compensation: automatic or manual
  - Temperature units
- Display
  - Select parameter (Reading (pH), mV or Temperature)
  - Calibration points
  - Meter mode, graph or table
  - Graph display pH (mV) and/or temperature
  - Stability criteria
- Calibration
  - Perform calibration
  - Calibration buffers: Hanna or NIST
  - Calibration reminder
- Logging
  - Delete saved sheet
- Alarms
  - pH(mV) and temperature

Nominal Lab App Specifications*	
Range**	
Resolution	
Accuracy (@20°C/68°F)	
Calibration Points	
Temperature Compensation***	
Compatibility (Current Recommended)	
Download Information	Download on the App Store

edge® pH



edge® pH – Innovation in a Single Parameter

Additional feature information

edge pH technical features













edge pH design features











Accepts edge compatible pH probes

0	0.5	88	8	5.5	2

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2

pH

edge® pH

A hybrid meter that can be used in portable, wall-mount and bench-top configurations









Digital electrodes



CAL Check™

pH electrodes

Research Grade Meter

pH/ORP/ISE and Temperature



Customizable User Interface

The user interface of the HI5222 allows the user to adjust measurements to suit his needs. Basic measurement with automatic GLP information and data logging data. Calibration reminder intervals can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to beep for out-of-range readings.

Color Graphic LCD

The HI5222 features a color graphic LCD with on-screen help, graphs, and custom color configurations. The display allows for multi-level grouping and the use of on-screen keys provide for an intuitive user interface.

Capacitive Touch

The HI5222 features zero-line capacitive touch buttons for accurate pH readings when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching between different readings and four soft keys that change based upon use. The capacitive touch technology ensures the buttons never get clogged or dirty or broken.

Two Universally Isolated pH/ ORP/ISE Channels

The HI5222 has two input channels that can be used for pH, ORP and ISE measurements. Each input channel has connectors for BNC probes, reference probes and a temperature sensor. Each channel is galvanically isolated which ensures that two measurements

probes can be in the same solution at the same time and the voltage can cause unwanted interference with each other.

Choice of Calibration

Automatic buffer recognition, semi-automatic, and up to 5 manually entered calibration options are available for calibrating up to five points, from a selection of eight standard buffers and up to five custom buffers.

GLP Data

HI5222 includes a GLP feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data includes date, time, buffers used for calibration, and also reads offset and slope of the electrode.

CAL Check™

CAL Check™ alerts users to potential problems during the calibration of the pH electrode. Messages include "Bulb broken" or "Junction clogged" and many more and the level of problem can be customized by the user. Each message can be set to display a message on the screen only, or to display a message and activate the alarm.

ISE Measurement with Choice of Concentration Units

The HI5222 allows for calibration and readings in a choice of concentration units. The choice of concentration units include ppm, g/L, mg/mL, ppm, mg/L, µg/L, ppb, µg/L, mg/mL, M (Molar), mmol/L. There is also a user defined unit.

ISE Measurement with Incremental Methods

The two most common incremental methods, Gran and Direct, are available for ISE measurements. Both can be pre-programmed into the HI5222. Simply follow the on-screen guided procedure and the meter will perform the calculations automatically allowing for a higher level of accuracy to be obtained as compared to a direct ISE measurement.

Data Logging

Three selectable logging modes are available on the HI5222: automatic, manual, and Automated logging. Automatic and manual logging can be set with 50,000 records each with up to 100,000 total data points per channel. Automatic logging features the ability to set data recording to sampling period and interval.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

Contextual Help

Contextual help is always available through a dedicated "HELP" key. Clear, to-the-point messages and illustrations are used to quickly and easily guide users through setup and calibration. The help information displayed is relative to the current screen being viewed.

CAL Check™ Screens



Additional Features by Screen





Dual Channels



Specifications		HI5222
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
mV	Range	
	Resolution	
	Accuracy	
	Relative mV Offset Range	
ISE	Range	
	Resolution	
	Accuracy	
	Calibration	
Temperature	Range	
	Resolution	
	Accuracy	
Meter and Sensor Features	pH Electrode	
	Temperature Probe	
	Automatic Recognition	
	GLP	
	Logging	
	Display	
	PC Connection	
	Power Supply	
	Environment	
	Dimensions	
	Weight	
Ordering Information		

2

pH

benchtop

Research Grade Meter

pH/ORP and Temperature



Customizable User Interface

Color Graphic LCD

Capacitive Touch

Choice of Calibration

GLP Data

CAL Check™

Data Logging

Data Transfer

Contextual Help

		HI5221
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
mV	Range	
	Resolution	
	Accuracy	
	Relative mV (RP) Range	
Temperature	Range	
	Resolution	
	Accuracy	
Additional Specifications		
Recording Instruments		

2

pH

Benchtop

pH Benchtop Meters

pH/mV and Temperature



- CAL Check™
  - Alerts users of calibration status
- GLP features
  - Meets Good Laboratory Practices
- Logging
  - Stores up to 200 readings
- Connectivity
  - PC connectivity via optional USB

Up to 4 Parameters, Single and Dual Channel

Hanna's HI3221 is a versatile benchtop meter with a graphic LCD designed to provide accurate laboratory results. The HI3221 is equipped with a pH/mV channel.

User Friendly Features

HI3221 features on-board help messages that are displayed on the screen to guide users through set-up, calibration and measurement. While a limited selection of only six buttons is available at the front of the meter, the help screen includes many useful messages for menu parameters. Calibration, logging, control and accessory information for your instrument.

CAL Check™

The instrument features Hanna's exclusive CAL Check™ algorithm which can alert users of problems during the calibration process. The CAL Check™ system eliminates erroneous readings due to dirty or faulty probes and contaminated or exhausted buffers. Throughout the calibration process, users are guided step-by-step by the on-screen tutorial. After calibration, the probe condition is evaluated and an indicator is displayed, indicating the color of the icon (light blue) to safe status.

Calibration

HI3221 features up to five point calibration with a choice of five custom buffers and seven standard buffers.

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CAL Check™ Features



- Calibration
  - pH and conductivity feature the exclusive CAL Check™ messages. Users are guided through the calibration procedure with step-by-step on-screen instructions.

pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
mV	Range	
	Resolution	
	Accuracy	
	Manual Offset Range	
Temperature*	Range	
	Resolution	
	Accuracy	
General Specifications	pH/mV probe	
	Temperature probe	
	Display	
	Logging Memory	
	Automatic Logging	
	PC Connection	
	Meter Dimensions	
	Power Supply	
	Environment	
	Dimensions	
	Weight	
Ordering Information		

2

pH

Benchtop

2.26

pH Benchtop Meter

with Built-in Printer

- CAL Check™
  - Alerts users of calibration status
- Five-point calibration
  - Five pH calibration points using standard or user-defined
- Logging
  - A convenient data logging of 1000 records, analog or manual
- GLP features
  - Meets Good Laboratory Practices
- Direct printing
  - Built-in compact printer



On-board Printing and CAL Check™ in One Instrument

HI 221 benchtop meter offers features, a built-in printer and CAL Check™. CAL Check™ monitors pH meter response time and conditions, and provides on-screen diagnostic messages during calibration.

Built-in Impact Printer

The built-in impact printer is incorporated into the HI 221 and requires paper roll and does not take ink. The information recorded by the meter, meaning data can be printed on-site measurements, log-on-demand or interval logging modes. The model also allows users to print detailed information in four languages for use in the help screens and instrument set-up.

Logging

Users can log up to 1000 samples and automatically log data up to 1000 points with flexible starting and stopping criteria.

GLP Capabilities

HI 221 provides GLP capabilities that allow for the retrieval of data regarding pH, mV, EC and salinity calibration as well as data regarding the maintenance and status of the electrodes.

Calibration

This meter uses Hanna's "P" series of electrodes. Calibration can be performed up to five points using the standard pH buffers or by using the custom buffer values. The buffer(s) used during calibration are displayed on the LCD and when it does not match the

Specifications		HI 221
pH	Range	-2.00 to 16.00 pH, -2.000 to 16.000 pH
	Resolution	0.01 pH/0.001 pH
	Accuracy (@ 20°C)	±0.02 pH, ±0.002 pH
	Calibration	automatic, one, five points with choice of standard buffers: 4.01, 6.86, 7.01, 9.18, 10.01, 12.45 pH and custom buffers
	Temperature compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 212.0°F)
mV	Range	±1999.9 mV/±2000 mV
	Resolution	0.1 mV/1 mV
	Accuracy (@ 20°C)	±0.1 mV/±1 mV (±0.2 mV/±2 mV with HI 1131B)
	Calibration offset range	±30 mV/±60 mV
Temperature	Range	-20.0 to 120.0°C (-4.0 to 248.0°F)
	Resolution	0.1°C/0.1°F
	Accuracy (@ 20°C)	±0.4°C (±0.7°F)
Additional Specifications	pH Electrode	HI 1131B glass body pH electrode with BNC + pin connector and 1 m (3.3') cable included
	Temperature Probe	HI 7662-T temperature probe with 1 m (3.3') cable and mini DIN
	Log on demand	50 samples (25 per channel)
	Interval logging	1000 samples (500 per channel)
	Logging Interval	1 to 180 minutes
	PC Connection	RS232 cable (with cable included)
	Printer	built-in impact thermal printer with 58 mm roll paper
	Power supply	12 VDC adapter (not included)
	Environment	0 to 50°C (32 to 122°F); Relative Humidity 95% max. non-condensing
	Dimensions	220 x 210 x 90 mm (8.7 x 8.3 x 3.5")
	Weight	1.1 kg (2.4 lbs)
Ordering Information		HI 221 (EU) and HI 221-01 (US) pH benchtop meter with HI 1131P pH/ATC electrode, HI 76404/7 beaker (2), cable, HI 76404 glass (2) buffer solution sachet, HI 7662 pH (7.0) buffer solution sachet, HI 7662 pH (4.0) buffer solution sachet, HI 7004 (12.88 mS/cm) conductivity standard (2 pcs), adapter and instruction manual



pH Benchtop Meters

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Specifications			
pH	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
	pH Calibration	[illegible]	
	Temperature Compensation	[illegible]	
mV	Range	[illegible]	[illegible]
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
Temperature	Range	[illegible]	
	Resolution	[illegible]	[illegible]
	Accuracy	[illegible]	[illegible]
General Specifications	pH Electrode	[illegible]	
	Temperature Probe	[illegible]	
	Case Protection	[illegible]	
	Power Supply	[illegible]	
	Environment	[illegible]	
	Dimensions / Weight	[illegible]	
Ordering Information	[illegible]		

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pH Benchtop Meters

with Manual Temperature Compensation and Analog Output





pH Meters

for Education

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pH	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
Temperature	[illegible]	[illegible]
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2

pH

[illegible]

2

pH

portable

Professional Waterproof Meter

pH/ORP



Designed for professionals



Backlit Graphic LCD Display

Waterproof Protection



Quick Connect Probe



pH Calibration

Enhanced Calibration

Cal Check™



GLP



Data Logging

Intuitive Keypad

AutoHold

Dedicated Help Key



Setup Screen

PC Connectivity

Long Battery Life



Rugged Custom Carrying Case



HI12561 pH Electrode

- Glass body
  - Titanium sleeve and platinum pin ensure durable construction and allow the transfer of heat to the internal temperature sensor for rapid temperature measurements
- Pre-amplified low pH (for ultra-pure water)
  - Rapid solution response

Calibrate right in the case with custom beaker holders

Our custom-designed carrying cases feature beaker holders for calibration in the field



Specifications		HI98128
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
mV	Range	
	Resolution	
	Accuracy	
	Relative mV (Offset) Range	
Temperature	Range	
	Resolution	
	Accuracy	
Electrode Specifications	pH Probe	
	Temperature	
	Cable Length	
	Connector	
	Body Material	
	Junction Type / No.	
	Reference	
	Membrane	
	Dimensions / Weight	
Ordering Information		



Portable pH/mV Meter

- CAL Check™
  - Alert in case of calibration errors
- Backlight
  - Backlit, multi-level LCD display
- Electrode Preparation Guide (EPG)
  - automatically shows if meter and electrode is ready to take accurate readings
- Battery indicator
  - Battery percentage displayed on the LCD
- Data Protection
  - Data is always retained in LCD

The HI 2125 includes Hanna's exclusive CAL Check™ technology. CAL Check™ monitors the pH bulb every time the instrument is switched on and alerts if a dirty pH electrode, CAL Check™ warns users that recalibration is required.

Calibration buffers are automatically displayed in memory, ranked in order by temperature, so that the user selects a calibration point. Users can easily determine if readings are taken outside the calibration range.

The HI 2125 can store and recall up to readings at the touch of a button and features a real-time clock.

HI 2125 includes the HI 1053 double junction pH electrode. The double junction design helps to minimize any contamination for consistent, accurate results. The HI 2125 can also measure ORP in the mV range using an optional ORP probe.

		HI 2125
pH	Range	
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	automatic one or two point pH calibration with 5 pH buffers available (pH 1.68, 4.01, 6.86, 7.01, 9.18) (USA, EU, NIST, technical buffers)
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
mV	Range	±699.9 mV / ±1999 mV
	Resolution	0.1 mV / 1 mV
	Accuracy	±0.2 mV / ±1 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C / 0.1°F
	Accuracy	±0.4°C; ±0.8°F
Additional Specifications	pH/Electrode	HI 1053B pH/ATC combination electrode with 1 m (3.3') cable and BNC connector
	Temperature Probe	HI 7662-T ATC probe with 1 m (3.3') cable
	Range of Measurement	0 to 50°C (32 to 122°F)
	Automatic Shutoff	1, 5, 10, 30, 60 minutes or never
	Battery Type / Life	4 x 1.5V AAA alkaline batteries / 200 hours with backlight ON and new batteries
	Built-in GLP	date, time and calibration data can be recalled
	Environment	0 to 50°C (32 to 122°F) RH max 100%
	Dimensions / Weight	190 x 70 x 38 mm (7.5 x 2.8 x 1.5") / 310 g (10.9 oz)
Ordering Information	HI 2125 is supplied in a rugged carrying case with pH/ATC combination electrode, pH 7.01 and pH 4.01 buffer solutions, electrode conditioning solution, instruction manual and quick guide.	

* Specifications are subject to change without notice.

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2

pH

portable

Portable pH/mV Meters





pH/pH-mV/ORP and Temperature Meters



2

pH

portable

Direct Soil pH Meter

with Measurement Kit





2.46



Portable pH Meter

for Plating Baths

- Automatic
- Temperature compensation
- Rugged
  - Compact, heavy-duty and waterproof and for harsh testing
- Battery Low Recognition System (BLRS)
  - Alerts the user of low battery power that could adversely affect readings
- Battery life indicator
  - Battery percentage displayed on start-up
- HACCP Protocol
  - Time of last calibration displayed on LCD

HI991131 is a waterproof, pen-style pH and temperature meter supplied with a flat-tip probe specifically designed for use in plating baths.

The HI991131 is pre-calibrated, the electrode has a pH probe that is easy to clean and prevents the ingress of solutions from collecting beyond the sensor. The stainless steel body of the HI991131 functions as a potential shielding for the lowest possibility of reading and extended sensor life.

pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
Temperature	Range	
	Resolution	
	Accuracy	
General Specifications	Electrode	
	Battery Type / Life	
	Auto-off	
	Environment	
	Dimensions / Weight	
Ordering Information	HI991131	



- Optional accessories
  - Specially designed to protect your instrument from damage or impact

HI740025 Boot

HI740044 Rubber

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2

pH

portable

Portable pH Meter

for Boiler and Cooling Towers







Portable pH Meter

for Leather and Paper



2

pH

portable

pH / Temperature Meter for Milk

with Application Specific Probe

- [illegible]
- [illegible]
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[illegible]



Calibrate and measure samples right in the case

[illegible]



On-screen Features



















Rugged custom carrying case

2

pH

pH / Temperature Probe for Milk



Application Importance



2

pH

portable

pH / Temperature Meter for Yogurt

with Application Specific Probe

- waterproof
- Application specific electrode
- Automatic Temperature Compensation (ATC)
- Automatic one or two point calibration
- Multi-level LCD display
- On-screen tutorial for calibration and testing
- Stability indicator for accurate measurements
- Battery Error Prevention System
- Battery life displayed on startup
- Supplied as a complete kit

The HI 99164 is a durable, waterproof, and portable pH and temperature meter designed specifically for yogurt analysis. Automatic calibration is done at one or two points with two sets of buffers. All calibration and measurement readings are automatically compensated for temperature changes. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration time/date.



Calibrate and measure samples right in the cup

Our custom cup design also features a groove for calibration or measurement flow.



On-screen Features



















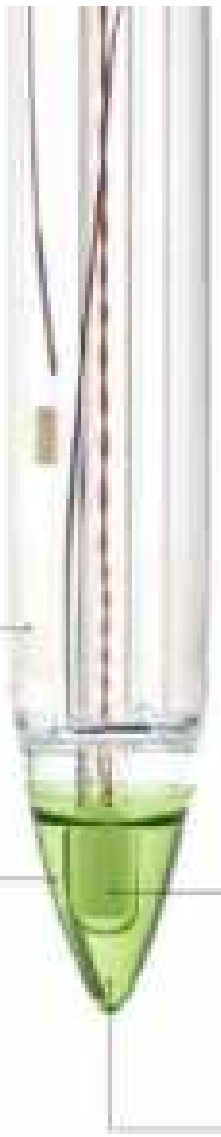
Rugged custom carrying case

2

pH

controller

pH / Temperature Probe for Yogurt



Application Importance



2

pH

portable

pH / Temperature Meter for Cheese

with Application Specific Probe

- waterproof
- Application specific electrode
- Automatic Temperature Compensation (ATC)
- Automatic one or two point calibration
- Multi-level LCD display
- On-screen tutorial for calibration and testing
- Data log function for automatic data recording
- Battery Error Prevention System
- Battery life displayed on the display
- Supplied as a complete kit

The Hanna instruments HI99165 is a durable, waterproof, and portable pH and temperature meter designed specifically for cheese analysis. Automatic calibration is carried out in two points with two sets of buffers. All calibration and measurement readings are automatically compensated for temperature changes. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration reminders.



Calibrate sanitize right in the case

The protective carrying case features a battery holder for calibration on the product itself.



On-screen Features



















Rugged custom carrying case

2

pH

controller

pH / Temperature Probe for Cheese



Application Importance



2

pH

portable

Portable pH Meter

for Food and Dairy





Specifications		HI98161
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
Temperature	Range	
	Resolution	
	Accuracy	
Hardware		
Additional Specifications	Battery Type / Life	
	Auto-off	
	Dimensions	
	Instrument Weight	
Ordering Information		



Portable pH Meter

and Sensor for Meat





2

pH

portable

Portable pH Meter

for Drinking Water





The pH of Drinking Water

The pH of drinking water is a critical measurement. If the pH is too low, or acidic, the water will be corrosive to the distribution system and water pipes in homes. The pH of seven also influences other parameters including taste, coloring, and the ability of disinfectants like chlorine to work. In the United States, the pH of water is determined by acid meter according to EPA method 150.1 and Standard Methods 4500-H.

When drinking water comes out of tap water (lakes, rivers, and streams) or groundwater as their point source. Surface water is typically lower in mineral content, which results in lower pH (7.0) readings. Groundwater that has come in contact with rocks, dolomite or gypsum will have a relatively higher mineral content. Depending on location, there are sources of groundwater that can be very low in minerals or ions.

Measuring the pH of water is not a universally same as pH. The lower the mineral content the less conductive the water will be. Low conductivity water presents a challenge in measuring pH meters as an electrochemical system that relies on the conductivity measured to be precise. See the HI2002 and the FC2150 amplified pH electrode. The FC2150 has three ceramic junctions in the outer reference cell that allow for pH measurement in low conductivity solutions.

Specifications		HI2002
pH	Range	0.00 to 14.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH
	Calibration	Auto-recognition of 4 standard buffers (manually calibrate 1 to 5 points with any pH value)
	Temperature Compensation	Automatic from 0 to 50°C (32 to 122°F)
Temperature	Range	0.0 to 50.0°C (32.0 to 122.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding electrode) ±0.8°C (±1.5°F) (including electrode)
Additional Specifications	Electrode	FC2150 pH amplified electrode with 1 meter (3.3') cable and BNC connector (HI2002 is compatible with HI1001 and HI1131 electrodes)
	Battery Type / Life	1.5V AAA (LR03) approximately 2,000 hours of continuous use
	Auto-Off	after 15 minutes of inactivity or user selectable
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions / Weight	153 x 78 x 35 mm (6.0 x 3.1 x 1.4") / 255 g (9.0 oz)
Ordering Information	HI2002-02 is supplied with FC2150 pH electrode, electrode holder, pH 4.01 and pH 7.01 buffer solutions (20 mL), HI70004P and HI70007P buffer solutions (2 x 20 mL), instruction manual and hard carrying case.	

* Other electrodes available, see page 137.

** Specifications subject to change without notice.

FC2150 Amplified pH Electrode

- Built-in temperature sensor for automatic compensation of temperature variations
- Refillable pH electrode
- Amplified electrode
  - Active circuit to counter effect of electrical noise due to humidity
- Triple ceramic junction design

The HI2002 drinking water pH meter uses the glass body FC2150 amplified pH electrode. The amplified electrode provides a built-in circuit to counter effect of electrical noise due to humidity. The electrode contains an internal reference which allows for automatic compensation for drift caused by temperature changes. The electrolyte solution in the electrode is refillable.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being measured. The ions provide for an electrical connection between the reference electrode and the measuring electrode. A standard pH electrode will have a single ceramic junction that allows for 10 to 20 µL/hour of electrolyte to flow. The FC2150 has three ceramic junctions allowing for 40 to 60 µL/hour of electrolyte to flow. This increased flow provides a greater contact between the reference electrode and the sample, making it suitable for water of low ionic strength. To control the flow from the electrode, the refill cap should be unscrewed. This allows for greater head pressure to be created, providing for the correct rate of flow needed into the sample.

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2

pH

portable

Portable pH Meter

for Beer Analysis







FC2140 Amplified pH Electrode

- Amplified electrode
  - Provides a fast, stable response that is immune to electrical noise due to static discharge
- Maintenance free gel filled electrode
  - No fill solutions required
- Highly durable construction
- Extendable cable (up to 50 m) for remote logging
- High sample throughput

The HI99163 bench pH meter with the Hanna brand FC2140 amplified pH electrode with built-in temperature sensor. The amplified electrode provides a fast, stable response that is immune to electrical noise due to static discharge. The body of the electrode is made from materials which provide an unbreakable glass bulb that allows the transfer of heat to the internal temperature sensor for rapid temperature compensation.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being measured. It is vital that this flow is consistent to ensure accurate and repeatable measurements. Any clogging of the reference junction will prevent the circuit from being completed and will result in readings that are inaccurate or constantly drifting. A typical problem with a junction made of ceramic material is that it can be easily clogged by samples with a high solids content or even that it dries out. With the open junction this possible to clean the junction by simply exposing it to the sample solution.

The Effects of pH in Brewing

Specifications		HI99163
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
Temperature	Range	
	Resolution	
	Accuracy	
Additional Specifications	Electrode	
	Battery Type / Life	
	Body IP	
	Dimensions	
	Instrument Weight	
Ordering Information	HI99163	

2

pH

portable

Portable pH Meter

for Wine Analysis







The Importance of pH in Wine Making

HI10480 pH electrode

2

pH

portable

Portable pH Meter

for Skin







General Purpose pH/mV Meter

- Automatic Temperature Compensation (ATC)
- Waterproof
  - Complete 3 mm (1/8") thick, IP67 waterproof and corrosion resistant housing
- Two-point calibration
  - Easy prompted one or two-point calibration
- Hold
  - HOLD function
- Battery indicator
  - Low battery indicator

The HI 9424 is a highly accurate, portable, pH/mV meter. It is one of the most popular pH meters on the market. This instrument is able to perform pH, mV and temperature measurements with a high degree of accuracy and fast response.

Calibration is conducted in one or two points, with three memorized buffer values (pH 4.01, pH 7.01 and pH 10.01). Once the instrument has been calibrated, the buffer values used during calibration are displayed with help on the LCD. This feature helps users eliminate the incorrect calibrations and helps to avoid taking measurements that are out of range.

Users can exchange the pH probe for another probe (such as pH/ORP probe) to obtain ORP readings in the mV range. The HI 9424 also offers relative measurements in °C and °F and has an auto-off feature to prevent unnecessary battery use.

Specifications		HI 9424
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
mV	Range	
	Resolution	
	Accuracy	
Temperature*	Range	
	Resolution	
	Accuracy	
Additional Specifications	pH Electrode	
	Temperature Probe	
	Single / Offset Calibration	
	Auto-Hold®	
	Battery Type / Life	
	Auto-off	
	Environment	
	Dimensions / Weight	
Shipping Contents		

* Temperature measurement in °C only.

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2

pH

portable

Analog pH/mV Meters





Educational pH Meters

- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Specifications		[illegible]	[illegible]
pH	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
mV	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
Additional Specifications	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]
Ordering Information	[illegible]	[illegible]	[illegible]

[illegible]

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2

pH

portable

pH/mV Precision Simulators





pH			
mV			
Additional Specifications			
Ordering Information			

pH Electrodes

Designed and Manufactured by Hanna



At the Forefront of Electrode Technology

pH Electrode Manufacturing

pH Theory and Measurement

How Temperature Affects Solution pH

2

pH

pH Electrodes

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pH Measuring System

pH Electrode

Reference Electrode

High Input Impedance Meter

Chemical pH Buffers

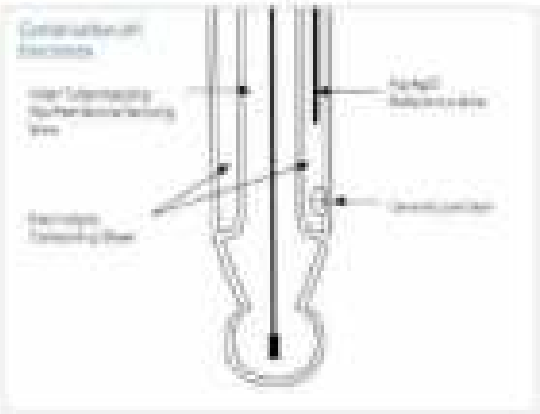
Thermometer or Temperature Probe

Magnetic Stirrer



Electrode Design





Half-cells vs. Combination pH electrodes

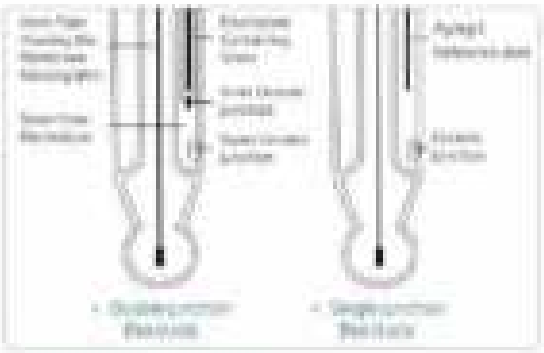
pH Electrodes

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Single junction vs. Double junction

Conventional electrodes are normally single junction as depicted by the figure below. These electrodes have only a single junction, which serves to put the reference electrode system in contact with the sample. Under certain conditions, such as high pressure, high temperature, highly acidic or alkaline solutions etc., the controlled flow of the electrolyte through the junction is often reversed, resulting in the ingress of sample solution into the reference compartment. If this is left unchecked, the reference electrode can become contaminated, leading to complete electrode failure. Another potential problem with single junction electrodes is the clogging of the junction due to $AgCl$ precipitation. $AgCl$ is only soluble in the sample from the reference electrolyte solution. Therefore, unless the electrolyte solution makes contact with the sample, some $AgCl$ will precipitate on the external face of the junction. The result is drifty readings or slowed down response.

Hanna double junction systems, as the name implies, have two junctions, only one of which is in contact with the sample as shown in the figure below. In certain circumstances, the external filling solution may be contaminated. However, as the reference electrode system is separated physically from the sample by an extra electrolyte area, the corrosive nature of the sample is minimized. The likelihood of clogging of the junction is also reduced with a double junction electrode since the outer reference cell uses a fill solution that is "driven from" rather than in to the sample. However, there is no pressure forcing the solution



Types of Junctions:

Porous Ceramic



Normally used in electrodes with glass bodies because ceramic with the correct expansion coefficient is easily welded to glass. Ceramic is available with different porosities and diameters. It may be referred to as a straight or

Porous PTFE (Polytetrafluoroethylene)



Porous PTFE is a hydrophobic material that is available with different porosities. Because of its chemical advantages, PTFE is widely used in a host of applications.

Fiber Wick



This type of junction is often used on epoxy bodied and submersible probes. The advantage of this junction is its renewability. As the wick becomes dirty or is pulled out from its protective, the junction is renewed with an uncontaminated, fresh surface.

Open Junction



This type of junction is often found in refillable bulb cells and is filled with a specific electrolyte solution that is in direct contact with the solution to be measured. Its advantage is that open junctions have minimal resistance and are less clogging prone.

Cone Style



This style junction is also renewable. As the sleeve or collar is moved, both the solution reservoir and the junction with the electrolyte. This is a higher flow rate than a ceramic type and is often specified for ISE measurements.

Other types of junctions include:

Capillary junction

This type of junction can be made with smooth or frosted glass. The advantage of a capillary junction is a fast flow rate and an open chamber. It is typically used with Ag/AgCl reference systems.

Open Platinum

This style junction is made by partially sealing the Pt wire through the glass, creating a leakage path. These have high flow rates.

Fiberglass

This style junction is very similar to a fiber wick. The junction is typically removable and may have a high flow rate, depending on internal member in the assembly.

2

pH

pH Electrodes

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Four Different pH Sensitive Glass Formulations

[illegible] Hanna offers four different types of pH sensitive glass to cover the vast number of applications. For routine measurements in laboratory and field use, the universal glass (HW) is the ideal choice. For measurements in extreme pH conditions, the high pH glass (HP) is the best choice. For measurements in low conductivity samples, the low ionic strength glass (LT) is the best choice. For measurements at high temperatures, the high temperature glass (HT) is the best choice.

GP Glass

The GP glass is a general purpose glass that is suitable for a wide range of applications. It is a good choice for measurements in the pH range 1 to 12 and at temperatures up to 80°C (176°F). It is also suitable for measurements in samples containing proteins, such as milk and blood.

LT Glass

The LT glass is a low temperature glass that is suitable for measurements in the pH range 1 to 12 and at temperatures up to 80°C (176°F). It is also suitable for measurements in samples containing proteins, such as milk and blood.

HT Glass

The HT glass is a high temperature glass that is suitable for measurements in the pH range 1 to 12 and at temperatures up to 130°C (266°F). It is also suitable for measurements in samples containing proteins, such as milk and blood.

HF Glass

The HF glass is a high temperature glass that is suitable for measurements in the pH range 1 to 12 and at temperatures up to 130°C (266°F). It is also suitable for measurements in samples containing proteins, such as milk and blood.

Different Shaped Membranes (Tips)



The pH membrane is the part of the electrode that is in contact with the sample. It is usually made of glass, but can also be made of other materials, such as plastic or ceramic. The shape of the membrane can affect the accuracy and speed of the measurement.



A **spherical tip** is recommended for general use in aqueous or liquid solutions and provides a stable surface of contact with the sample.



A **conical tip** is recommended for semi-solid products, emulsions, cheese, meat and food in general.

A **flat tip** is recommended for direct surface measurement on skin, leather, paper, etc.

Body Material

The body of the electrode is made of glass. The glass is a good choice for measurements in the pH range 1 to 12 and at temperatures up to 80°C (176°F). It is also suitable for measurements in samples containing proteins, such as milk and blood.

pH Electrodes

Designed and Manufactured by Hanna

Matching Pin

A matching pin is a differential measurement technique used to eliminate ground loops and common mode perturbations for the measurement system. An ingenious and exact matching pin, electrically connected to the solution ground via the reference half cell voltage that is connected via the liquid junction with the sample. In this case, the net ground and noise pick up the environment gets fluids and the measurement of the pH is correct. The matching pin isolates these current changes. Apart from the reference electrode, the most critical parameter of a pH cell is the matching pin design for safe grounding and measurements.

Types of Connectors

Most instruments accept probes fitted with one of the connectors listed below.

The BNC connector is the most versatile since it can be used with any meter that utilizes BNC. Applications Covered.

DIN, 3.5 mm, 5 mm and 7 type connectors are generally proprietary to the meters they are supplied with, 3.5 mm and 7 type connectors attach directly to the meter.

Even though 3.5 mm and 7 type connectors can be fitted by the user, these can also be made more compatible with other meters by using a Hanna DIN extension cable.


DIN


Quick DIN


BNC


BNC - PIN


T Type


Screw


3.5 mm Quick

Water Conductivity and pH Measurement

pH is the measurement of hydrogen ion activity. Ultrapure water is the purest solvent and rarely discloses many things. The pH glass surface can actually become dehydrated if stored or used in demineralized distilled water source and leached from the pores by surface phenomenon. Hydrogen ions in solution permeate with a conductivity of approximately 350 µS/cm to function properly.

In the case of low conductivity samples from ion exchange (DI) columns and reagent grade solutions with conductivity in the 1 µS/cm range, it takes a few minutes for the pH glass to hydrate and for the pH reading to stabilize. Therefore, it is important to use a high quality, purified distilled water or higher (low ionic) conductivity solutions for fully accurate electrode readings.

Alkaline Error

Alkaline error occurs in all high pH solutions when the hydrogen ions in the pH layer are partially or completely substituted with alkali ions. The resulting pH displayed is lower than it actually should be.

The difference between the desired and measured pH is called the alkaline error. Sodium ions are typically the ions that are responsible for pH residual errors between pH 9 and 12 for most pH glasses. In earlier glass compositions, the alkaline error was seen to start at 10 pH. Newer glass formulations are more especially formulated to minimize this error now exhibit an error starting at 12 or 13 pH.

To solve the problem of alkaline error, the most high temperature (HT) glass electrodes should be used for measuring alkaline solutions. The tables below show the alkaline error that exists with Hanna glass types at ambient temperatures.

Alkaline Error with 0.1 M Sodium

pH	pH	pH	pH	pH
9.0				
9.5				0.08
10.0				0.11
10.5			0.15	0.17
11.0	0.08		0.19	0.26
11.5	0.14	0.09	0.28	
12.0	0.23	0.13	0.39	
12.5	0.34	0.19	0.49	
13.0	0.48	0.25	0.61	

Alkaline Error with 0.1 M Sodium

pH	pH	pH	pH	pH
9.0			0.10	0.15
9.5			0.14	0.20
10.0	0.08		0.20	0.28
10.5	0.14	0.06	0.28	0.36
11.0	0.24	0.10	0.40	
11.5	0.37	0.16	0.53	
12.0	0.52	0.23		
12.5	0.69	0.30		
13.0	0.87	0.37		

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pH

pH Electrodes

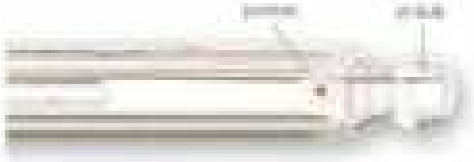
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Calibration

pH Electrode Preparation Procedure

A clean, conditioned combination electrode will provide the best measurements in solution. When using a new electrode, remove the protective bulb cap and inspect the electrode.

Rinse off with water. During transport, air bubbles may have formed inside the glass stem. Shake down the electrode as you would with a clinical thermometer. Condition the bulb using tips soak the pH bulb and reference junction for at least two hour or longer. If possible, an overnight soak is best. This will promote stabilized glass hydration and thoroughly wetted reference junction.



Rinse Electrode with Purified Water

Prior to placing the electrode in calibration solutions, it should be thoroughly rinsed with clean, purified water to prevent any contamination to the pH buffer. The electrode should always be rinsed with purified water after placing it in any solution.

Use Fresh pH Buffer for Calibration

The calibration of the pH electrode is only as good as the buffer used. Once a bottle of buffer is open, it should be discarded after six months of use. To prevent most contamination, never pour buffer back into the bottle. If the used buffer is to be used for multiple calibrations, it is best to have a small amount of buffer in a separate container that can be discarded. If using a separate container, the buffer should be changed frequently (i.e. daily, weekly).

Open Reference Fill Gap on Refillable Electrodes

If using a refillable pH electrode, the fill cap should be removed prior to calibration and measurement. Removing the cap creates positive head pressure in the reference and allows for a higher flow rate of electrolyte through the reference junction. A higher flow rate will result in a faster and more stable reading.

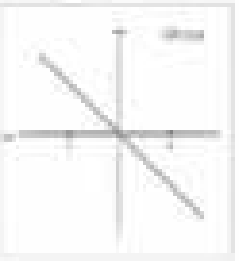
Submerse Electrode Past Junction

It is critical that the junction of the electrode be completely submersed in the pH buffer or sample. Failure to do so will result in erratic readings.



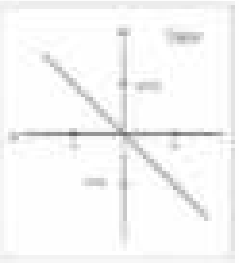
Use a Magnetic Stirrer

For benchtop meters, it is beneficial to use a magnetic stirrer. A magnetic stirrer will ensure that the pH buffer or sample is homogenous. The movement of the solution will also increase the response time of the electrode in the solution.



One-point Calibration

For one-point calibration it is important to calibrate the pH electrode in pH 7.0. This calibration determines the offset value. The pH value at pH 7.00 clearly should be 0.00.



Multiple-point Calibration

For improved accuracy it is recommended to use at least a minimum of two points. The second point determines the slope of the line. It is important to use buffers that bracket the expected value of the sample to be tested. For example, if the expected value is pH 6, the electrode should be calibrated using pH 7.00 and pH 10.00 buffer.

Electrode Fill Solutions

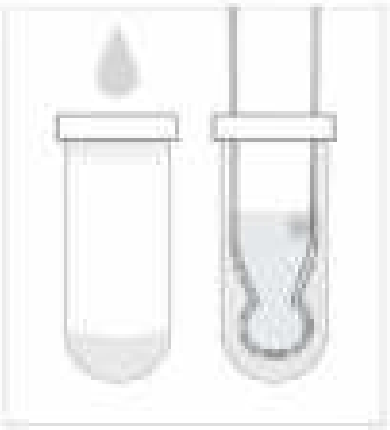
The electrode should be filled with the proper electrolyte solution to ensure the right pressure. Refer to the electrode manual for the proper electrolyte solution.



Maintenance and Storage

General Maintenance Tips

Periodically check the offset and slope characteristic of the pH electrode



How to calculate offset and slope

Electrode Storage Solutions

Never store a pH electrode in purified water as it will dehydrate the bulb.

Inspect the electrode for any scratches or cracks on the bulb or stem. If any are present, replace the electrode.

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pH

pH Electrodes

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Electrode Cleaning

Cleaning Procedure

The most common cause for pH measurement inaccuracy is an unclean or improperly cleaned electrode. This is very important to note, as by cleaning a dirty tool, the instrument assumes that the new, cleaned state is the standardized one and therefore during the calibration process will remain a valid reference point. The next calibration, pH meters on the market today will show an offset voltage of approximately ±60 mV. The deviation from 0 mV is not precise but ideally should be no greater than ±30 mV. The calibration process compensates for this change in offset voltage.

Calibrating a meter with a dirty electrode will result in inaccurate readings. If the mV offset continues to deviate with a properly cleaned electrode, it is a good indication that the electrode may need to be replaced.



In daily use the electrode's surface may become contaminated with a film of oils, fats or proteins. This film can usually be removed by rinsing with a mild detergent solution.

Then rinse it very well with deionized water. If the film is still present, try a more aggressive cleaning solution. If this does not work, soaking the electrode in a warm (not hot) detergent solution may help. Rinse well with deionized water.

A unique cleaning and rejuvenating procedure for the pH electrode is provided. Read the procedure carefully before using it and follow it exactly as written.

General Cleaning

Use the Hanna HI7061 General Cleaning Solution for approximately 30 minutes to dissolve mineral deposits and other general coatings.

Protein Cleaning

Use the Hanna HI7073 Protein Cleaning Solution for 15 minutes to remove commercially available deposits from protein sources.

Inorganic Scale

Use the Hanna HI7074 Inorganic Cleaning Solution for 15 minutes. This solution is especially effective on all removal of precipitates caused by reaction with the silver in the Ag/AgCl junction that may form on the electrode junction.

Oil and Grease Rinse

Oil and grease removal requires the correct chemicals to solubilize the coating. But one must be careful to avoid the electrode contact with Hanna HI7077 Oil and Fat Cleaning Solution.

After performing any of the cleaning procedures, rinse the electrode thoroughly with deionized water and then soak the electrode in HI 70300 or HI 80300 storage solution for at least 1 hour before taking measurements.

Troubleshooting

Drifting/Erratic Readings

Potential problems include:

Build-up on glass electrode – Clean electrode.

Clogged junction – Depending on the material clogging the electrode use appropriate specific cleaning solutions. Always be sure to rinse the electrode in high purity water or place in an acid such as 0.1M HCl or 0.1M HNO_3 at elevated temperature (50°C) for about an hour to clear blockage.

If the junction is constantly clogging due to interacting ions present in the sample, use a pH electrode with fresh KCl solution and a ceramic or open junction. For open junction designs of the HI 2300 series clogging will not be a problem and those electrodes can be efficiently cleaned by the ultrasonic cleaner.

Low conductivity solution – Use an electrode that has a high flow junction and high purity KCl or sample is measured RO.

Electrode is not properly hydrated – Soak in storage solution for at least 1 hour, if not longer.

Frozen pH Reading

Broken electrode – Possible short between internal pH and reference pin internal. Replace the sensor probe when placed in different buffers. The electrode should then be replaced.

Inaccurate Reading

Improper calibration – Make sure that pH electrode was rinsed well with purified water between buffers to prevent cross contamination and the electrode is at thermal equilibrium with the buffer.

Check offset and slope of electrode. If the mV value at pH 7.01 should be ± 30mV of 0 mV and the slope in mV/pH should be greater than 150 mV (95%). If the slope is less than 85% then use fresh buffers, change fill solution, and clean electrode. If the slope cannot be increased to an acceptable value, replace the probe.

Important note: When measuring pH of a sample, rinse the electrode with purified water and then with a small amount of the sample to be measured. Doing this will prevent cross contamination of the buffer solutions and sample. Never return the used buffer solutions to the original bottles.

When using the automatic buffer recognition feature, make sure the correct buffer values are selected. For example, if using pH 7 and pH 10 buffers, the meter may recognize pH 7 as pH 10 and vice versa. This will result in inaccurate calibration.

Calibrating and measuring at different temperatures–Either use a tester that has automatic temperature compensation or calibrate and measure at same temperature. Note that the buffer and various temperatures is noted on the bottle.

Measuring at high pH (> pH 10.0) introduces alkaline error–Use a pH electrode that has a HT glass to minimize alkaline error.

Calibration with an electrode that was not clean–Any coating that comes off the electrode during use will affect the electrode characteristics, resulting in the calibration being no longer valid.

Electrical noise interference can interfere with obtaining an accurate pH measurement–Noise from sensitive instruments, motors or pumps can interfere with the high impedance measuring circuit.

pH Electrode has a Short Life Span (< 6 months)

Elevated temperatures reduce the life span of pH electrodes. At room temperature (25°C), a pH electrode will typically last 1 to 2 years. A general rule is that for every 25°C increase the electrode's life will decrease by ½. Temperature cycling (hot to cold) also has a bad effect.

Operating Temperature	Average Lifespan
25°C	1 to 2 years
50°C	4 to 12 months
75°C	1 to 4 months
100°C	1 to 4 weeks

Measuring samples at temperatures greater than 50°C can quickly deteriorate even high temperature pH glass such as the HI1131.

Storing a pH electrode in purified water will shorten the life span of pH electrode–If using a refillable pH electrode, replace fill solution. If using a gel filled electrode, the electrolyte will have to be replaced. Store in storage solution.

Wiping a pH electrode with tissue will form an electrode–It is important to not wipe pH electrode. Wiping the electrode can produce a static charge on the sensor that will overwhelm the measurement. Allowing additional time before initial measurement can be beneficial.

Solutions adding pH buffer solution should be at room temperature. The electrodes will not accurately read if the temperature is not at 25°C. Use the HI7662 temperature probe to measure the temperature of the solution.

ORP Theory and Applications

ORP (Oxidation Reduction Potential)

Similar to the manner in which acids or alkaline solutions are defined by pH measurements, solutions can also be graded according to relative measurements of ORP (commonly called "redox").

When an oxidizing and/or reducing agent is introduced into aqueous solution, they may react with water to consume and produce a voltage, or electrical potential (EMF), that is related to the ratio of oxidizers to reducers present in the solution. As electron exchanges are completed between the solution and an inert metal sensor, redox equilibrium is established with a pH ion electrode. This type of measurement is known as redox or ORP. The unit's of measurement are in mV. At a glance, an ORP electrode may look very similar to a pH electrode. Like a combination pH electrode, both the sensor and the reference are housed in a common body.

The scale of measurement ranges from positive (+) to negative (-) potentials to represent oxidizing and reducing. It should be noted that a zero point is also present. It is really an arbitrary value that is set the reference voltage (-200 mV for an Ag/AgCl with KCl filled sensor) is included in the observed mV value. In some cases, the user may wish to offset this reading to remove the reference contribution. This is often said to be accounting the standard cell's potential or Nernst equation giving zero mV at 25°C.

An ORP sensor must be chemically inert; it cannot be oxidized or reduced itself. It must also have the proper surface crystal lattice to promote rapid electron exchange, a property known as high exchange current density. Two noble metals, these properties to exist and the most popular pure platinum and even gold are both used in the construction of ORP sensors.

The exchange process of the preferred electron is chemically simple and similar to pH. Platinum can be worked to glass and has the same thermal coefficient. Sensors made of gold cannot be worked to the glass and are often placed in plastic supports coupled to the glass or epoxy cast by means of tiny electrodes to stop. The gold or platinum sensor signal is carried through the electrode body and together with the reference signal is conducted to the measurement meter via a coaxial cable with BNC connector.

An ORP system does not have a high impedance source like a pH bulb. It is a potentiometric device that produces a voltage if two wires are connected, completing an electrical circuit. For this reason, a high impedance voltmeter or meter gain is not very user friendly features are essential for this measurement.

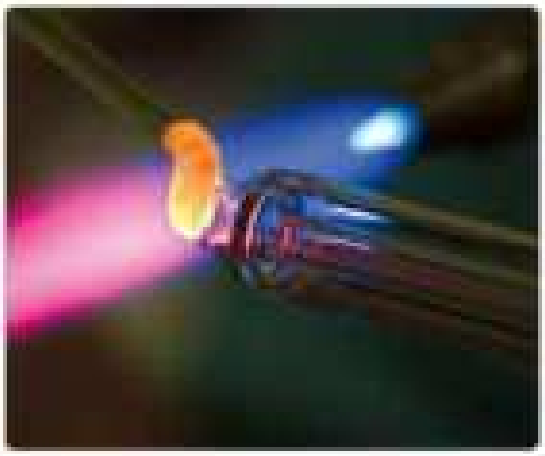
Because of the close relationship between pH and ORP, there is a scale that measures oxygen in the solution, called pOH scale. The pH scale ranges from 0 to 14, where the extreme values represent the reducing effect of an electron (one of pure hydrogen (H+) ions) and the oxidizing effect of an electronegative element (O-) respectively. The formula for obtaining the pH value is as follows:

2

pH

pH Electrodes

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$$\text{mV} = \frac{\text{mV}}{0.0591(273.15 + T_C)} \text{ pH}$$

Electrode Feature Guide: A Quick Glance

CAL Check™ System

Smart Electrodes

Pre-amplified Electrodes

Clogging Prevention System (CPS™)

Sensor Check™ for edge® Meters

Titration Casings

ORP Applications

Industrial Wastewater Treatment

Water Sanitation

pH Electrode Application Guides



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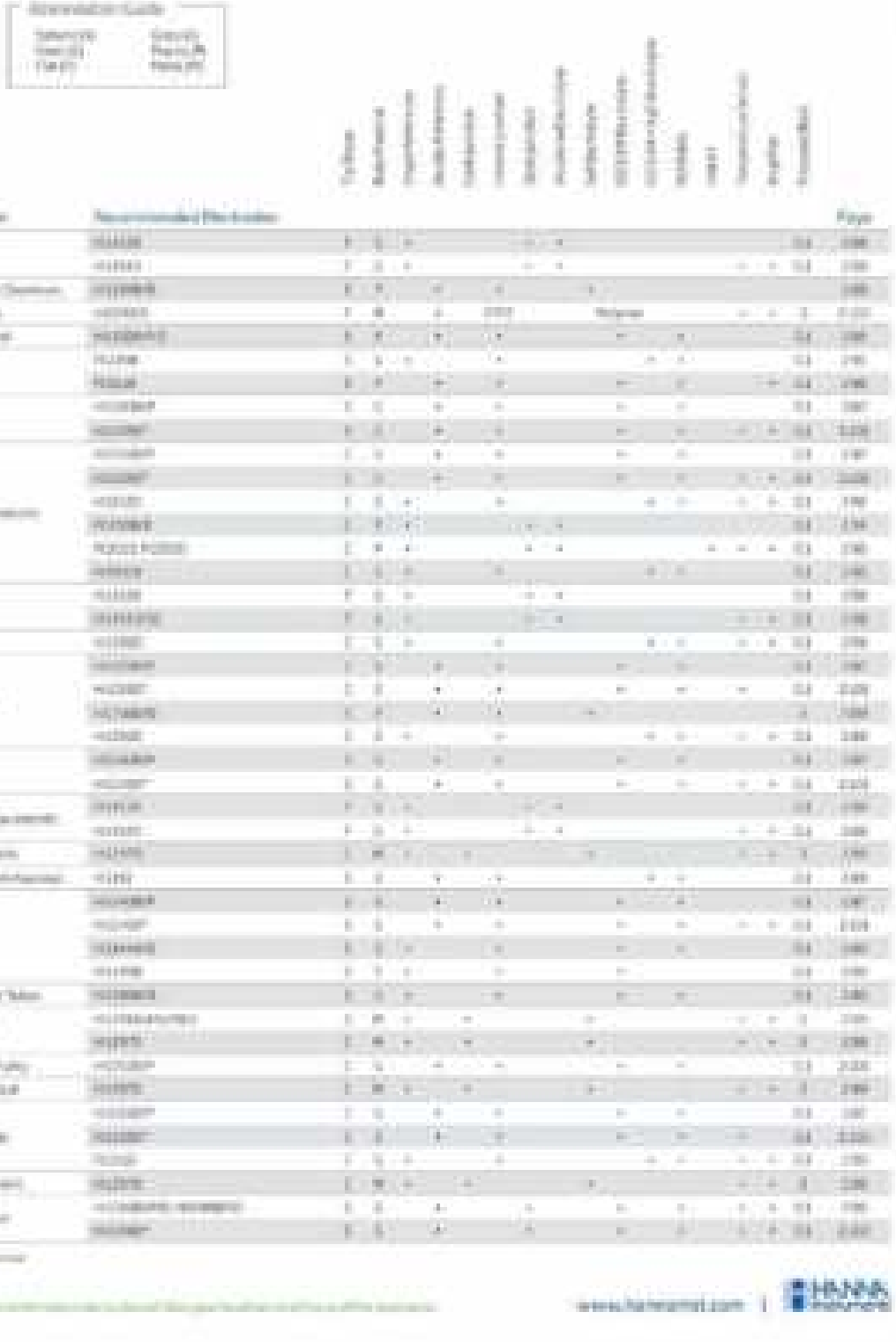
pH

electrodes

pH Electrode Application Guides



pH Electrode Application Guides



ORP Electrode Application Guides



Half-Cell and Reference Electrode Application Guides



Combination Electrodes



2

pH

electrodes

Combination Electrodes



Code				
Description				
Reference				
Junction / Flow Rate				
Electrolyte				
Max Pressure				
Range				
Body Material				
Cable				

Combination Electrodes



Tips for the Most Accurate Measurements

Keep Electrode Hydrated

Clean Electrodes Before Use

Replace Electrodes Once a Year

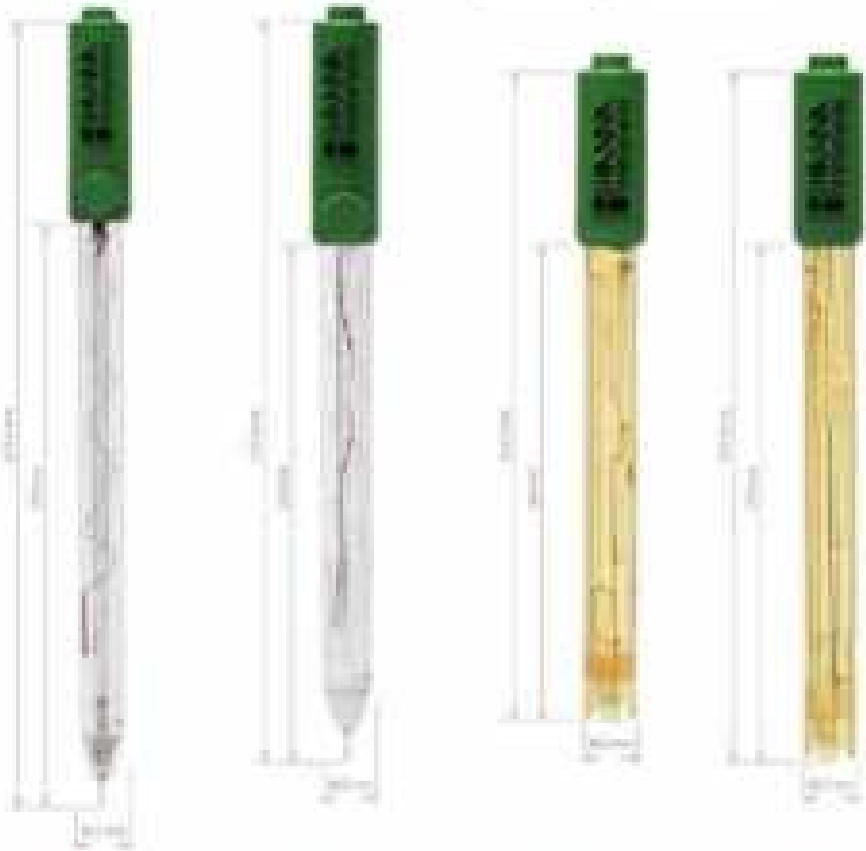
Additional Tips

Combination Electrodes



Body				
Reference				
Junction / Electrolyte				
Tip Shape				
Range				
Recommended Operating Temp.				
Tip Dimensions				
Temperature Sensor				
Application				
Body Material				
Cable				
Connector Type				
Order Code				

Special pH and ORP Electrodes



Body				
Description				
Dimensions				
Junction / Flow Rate				
Electrolyte				
Reference Type				
Range				
Temperature Range				
Tip Shape				
Temperature Sensor				
Application				
Membrane				
Cable				
Recommended for				
Connector				

2

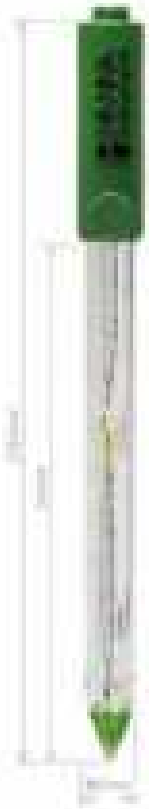
pH

electrodes

pH Electrodes with Temperature Sensor







Code			
Description			
Reference			
Junction / Electrolyte			
Membrane			
Stem/Measuring			
Range			
Resolution Operating Temp.			
Tip Shape			
Temperature Sensor			
Application			
Body Material			
Cable			
Accessories			
Connector			

Rugged pH and ORP Electrodes



2

pH

electrodes

Electrodes for the Food Industry



Electrodes for the Food Industry



Electrodes for the Food Industry



Electrodes for the Food Industry



2

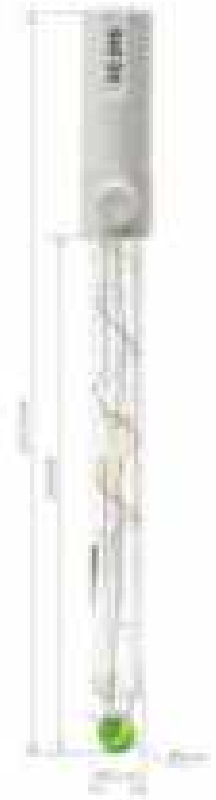
pH

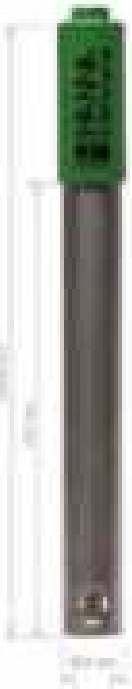
electrodes

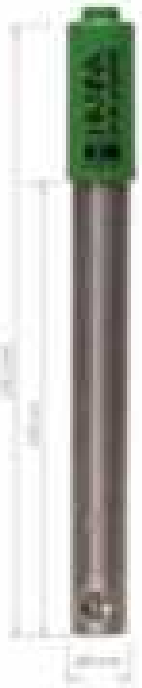
Electrodes for Specific Analysis



Electrodes for Specific Analysis







Body			
Glass Bulb			
Reference			
Junction			
Electrolyte			
Max Pressure			
Range			
Temperature Range			
Tip Shape			
Internal Body Material			
Amplifier			
Body Material			
Cable			
Recommended Use			
Connector			

Electrodes for Specific Analysis





Electrode Extension Cables






edge® Electrodes

edge® Electrodes



Code				
Description				
Reference				
Junction				
Body				
Max Pressure				
Range				
Recommended Operating Temp.				
Tip Shape				
Refillable/Gel Electrode				
Recharge				
Amplified				
Temp. Sensor				
Cable				
Recommended for				
Connector				



edge® Electrodes

2

pH

Half-Cells



Reference Electrodes



Body				
Description				
Reference				
Junction / Frit(s)				
Electrolyte				
Shaft Pressure				
Recommended Operating Temp.				
Max. Pressure				
Cable				
Recommended for				
Connector				



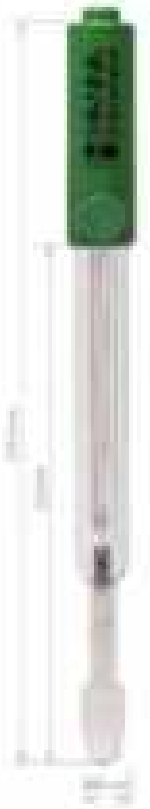
High pressure or high concentration of contaminants

2

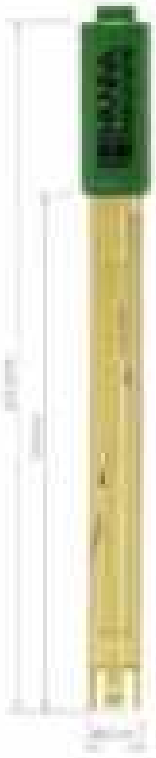
pH

electrodes

Reference Electrodes







pH and ORP Solutions



Ready-made Solutions

A Wide Variety of Single Dose Sachets

Sachets are Practical, Safe and Ready to Use

A Complete Range

Combination Kits in Bottles and Sachets

Table of Reference Temperatures

Bottles that Meet FDA Standards

Calibration and Cleaning Solutions

Certified Solutions

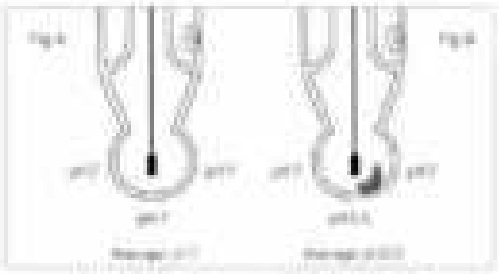
Safety Data Sheets

2

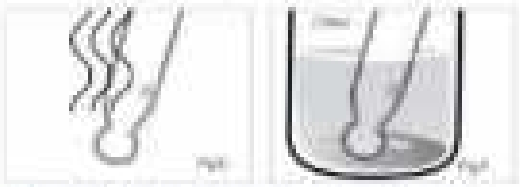
pH

Electrode Cleaning, Calibration and Maintenance

Step 1: Cleaning



pH Cleaning Procedure

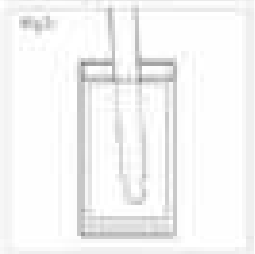


just because you can't see contamination doesn't mean it isn't there.

A dirty electrode can contaminate solutions.



Fresh Every Time



General Cleaning

Protein Cleaning

Inorganic Soak

Oil and Grease Rinse

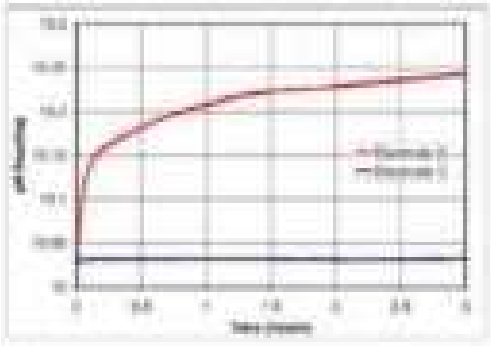
Step 2: Calibration

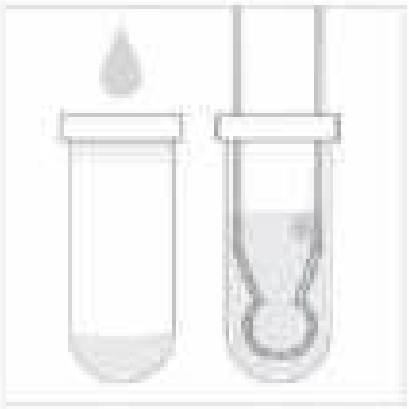
Calibration only counts when using fresh solutions and properly cleaned electrodes.



pH and ORP Solutions

Step 3: Maintenance





Electrode readings may vary with insufficient cleanings

Precision Solutions

Storage



Inspect

General Cleaning, Storage and Refilling Solutions

General Use Electrode Cleaning Solutions

Clean sensing portion of your electrodes weekly to prevent fouling and to maintain accuracy. Immerse the probe in one of the proper cleaning solutions for at least 15 to 20 minutes.

Electrode Storage Solutions

To minimize junction clogging and crystal build-up at the sensing area, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI70300 storage or pH 4 or pH 7 buffer solution in the protective cap.

Electrode Fill Solutions

The electrolyte level in reference electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution. Remove the rubber electrode pin to refill it. This simple maintenance helps guarantee adequate head pressure to keep the flow (junction) flowing.

Some electrolyte solutions are available in 1 litre convenient bottles.



General Use Electrode Cleaning Solutions

Code	Application	Package
HI700300P	cleaning	20 mL sachet x25
HI700611	general purpose	500 mL bottle
HI700616	general purpose	230 mL bottle
HI70671L	proteins	500 mL bottle
HI70672M	proteins	230 mL bottle
HI70674L	inorganic substances	500 mL bottle
HI70674M	inorganic substances	230 mL bottle
HI70677L	oil and fats	500 mL bottle
HI70677M	oil and fats	230 mL bottle
HI88711L	general purpose	500 mL (1 bottle)
HI88713	proteins	500 mL (1 bottle)
HI88717	oil and fats	500 mL (1 bottle)

Electrode Storage Solutions

Code	Description	Package
HI70300L	storage solution	500 mL bottle
HI70300M	storage solution	230 mL bottle
HI80300L	storage solution	500 mL (1 bottle) x 4
HI80300P	storage solution	230 mL (1 bottle) x 25

Electrode Fill Solutions

Code	Description	Package
HI7071	reference solution (3.5 M KCl + AgCl)	30 mL bottle
HI7071M	reference solution (3.5 M KCl + AgCl)	230 mL bottle
HI7071L	reference solution (3.5 M KCl + AgCl)	500 mL bottle
HI7082	reference solution (4 M KCl)	30 mL bottle
HI7082L	reference solution (4 M KCl)	500 mL bottle
HI7082	reference solution (3.5 M KCl + 1.76% $AgCl_2$, 0.7% H_2O)	30 mL bottle
HI7082	reference solution (1 M $LiAcO_2$)	30 mL bottle
HI7070	reference solution (3.33 M CH_3COOK + 1.76% $AgCl_2$, 0.7% H_2O)	30 mL bottle
HI7082	reference solution (3 M KCl)	30 mL bottle
HI7082M	reference solution (3 M KCl)	230 mL bottle
HI7082L	reference solution (3 M KCl)	500 mL bottle
HI8071	reference solution (3.5 M KCl + AgCl)	30 mL (10 bottles)
HI8082	reference solution (4 M KCl)	30 mL (10 bottles)
HI8083	reference solution (3 M KCl + AgCl)	30 mL (10 bottles)

Specific Cleaning Solutions - Bottles

Code	Description	Unit
HI700641L		500mL
HI700642L		500mL
HI700643L		500mL
HI700645L		500mL
HI700646L		500mL
HI700647L		500mL
HI700648L		500mL
HI700649L		500mL
HI700650L		500mL
HI700651L		500mL
HI700652L		500mL
HI700653L		500mL
HI700654L		500mL
HI700655L		500mL



- Flow-easy tip (part # 5 of delivery) from cap for precise dosage of cleaning and rinse solution for Checker measurements

Specific Cleaning Solutions - Sachets

Code	Description	Qty/Box
HI700662P		20 mL (25)
HI700663P		20 mL (25)
HI700665P		20 mL (25)
HI700666P		20 mL (25)
HI700667P		20 mL (25)
HI700668P		20 mL (25)
HI700669P		20 mL (25)
HI700670P		20 mL (25)
HI700671P		20 mL (25)
HI700672P		20 mL (25)
HI700673P		20 mL (25)

Cleaning Solution Series

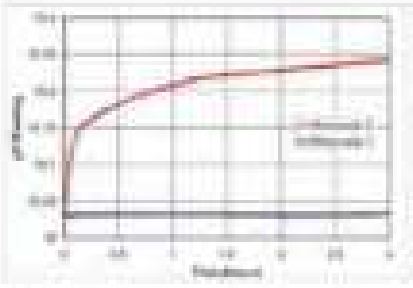


Focused Cleaning for a Top Performing Sensor

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

Hanna has developed a complete line of cleaning products that are solutions that will remove impurities and residues left on electrode surfaces when exposed to typical samples, including: soil, industrial solutions, grease, oils, and dairy products.

The Cleaning Solution Series ensures maximum efficiency and accuracy of your sensor is maintained for its designated application.



pH Technical Calibration Solutions



Technical Solutions (±0.01 pH) for Each Point of the pH Scale

To obtain precise and overall pH measurements, the pH meter and electrode must be calibrated at a minimum of two different points close to the value of the sample to be tested. For this type of calibration, Hanna offers technical solutions for each point of the pH scale.

The complete range of buffer solutions offers a higher degree of accuracy for pH measurements in specific areas of application, in maintaining the pH of mid and ions. The line includes twenty solutions starting from a value of pH 1.00 up to pH 13.00 with an accuracy of ±0.01 pH thus covering every point of the pH scale.

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

Also available are solution sachets that are colored according to a given standard (blue when you add the HI8007-0 (red), HI8007-4 (green) and HI8007-7 (violet).

Easy to Use Single Dose Sachets

For the highest level of reliability of field instrumentation, technical solutions are available in convenient single dose sachets in 20 or 25 pack quantities.

Hanna Combination Kits in Bottles

Use our combination kits for easy ordering and no dosing.

Code	Solutions (pH Value @25°C)	Bottle
HI50710		
HI50710-50		
HI50710-01		

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Bottles

pH Value @25°C	Code	Package
1.00	HI50001	500 mL
1.68	HI50004	500 mL
2.00	HI50002	500 mL
2.71	HI50002-06	6 x 20 mL
3.00	HI50003	500 mL
4.01	HI50004	500 mL
4.21	HI50004-01	20 mL
4.21	HI50004-B	500 mL (with UNIDOSE Cap)
4.01	HI50004-M08	12 x 20 mL (0.2 fl oz) Bottles (with measuring cup)
5.00	HI50005	500 mL
5.00	HI50005-01	20 mL
6.00	HI50006	500 mL
6.86	HI50068	500 mL
7.00	HI50007	500 mL
7.01	HI50007-06	6 x 20 mL
7.01	HI50007-C	500 mL (with UNIDOSE Cap)
7.01	HI50007-C08	12 x 20 mL (0.2 fl oz) Bottles (with measuring cup)
7.01	HI50016	500 mL
8.01	HI50008	500 mL
9.01	HI50009-01	20 mL
9.18	HI50091	500 mL
9.18	HI50092	500 mL
10.01	HI50093	500 mL
10.01	HI50093-01	20 mL
10.01	HI50093-C	500 mL (with UNIDOSE Cap)
10.01	HI50093-C08	12 x 20 mL (0.2 fl oz) Bottles (with measuring cup)
11.01	HI50011	500 mL
12.01	HI50012	500 mL
12.45	HI50124	500 mL
13.01	HI50013	500 mL

Sachets

pH Value @25°C	Code	Package
1.00	HI50001-02	20 mL (25)
1.68	HI50004-02	20 mL (25)
2.00	HI50002-02	20 mL (25)
3.00	HI50003-02	20 mL (25)
4.01	HI50004-02	20 mL (25)
4.21	HI50004-03	20 mL (25)
5.00	HI50005-02	20 mL (25)
6.00	HI50006-02	20 mL (25)
7.01	HI50007-02	20 mL (25)
7.01	HI50007-03	20 mL (25)
9.18	HI50009-02	20 mL (25)
9.18	HI50009-03	20 mL (25)
10.01	HI50010-02	20 mL (25)
10.01	HI50010-03	20 mL (25)
11.01	HI50011-02	20 mL (25)
12.01	HI50012-02	20 mL (25)
12.45	HI50124-02	20 mL (25)
13.00	HI50013-02	20 mL (25)

Bottles

pH Value @25°C	Code	Package
1.000	HI88001	500 mL
1.679	HI91101	500 mL
2.000	HI88002	500 mL
3.000	HI88003	500 mL
4.000	HI88004	500 mL
4.010	HI88004-55	5 L
6.000	HI88006	500 mL
6.865	HI88065	500 mL
7.000	HI88007	500 mL
7.010	HI88007-55	5 L
7.681	HI91171	500 mL
8.000	HI88008	500 mL
8.500	HI88009	500 mL
9.000	HI88091	500 mL
10.000	HI88010	500 mL
10.000	HI88010-55	5 L
10.000	HI88012	500 mL
12.450	HI88120	500 mL
12.460	HI88013	500 mL

Sachets

pH Value @25°C	Code	Package
1.000	HI88001-20	20 mL x 25
1.679	HI88101-20	20 mL x 25
2.000	HI88002-20	20 mL x 25
4.010	HI88004-20	20 mL x 25
7.010	HI88007-20	20 mL x 25
10.000	HI88010-20	20 mL x 25

Millesimal Series

±0.002 pH Millesimal Calibration Solutions

Millesimal Calibration Solutions

The HI8XXX line of buffers with millesimal accuracy (±0.002 pH) has been prepared to assure the most exacting need for accuracy in pH measurements. Each bottle of the series HI8XXX is provided with a certificate of analysis, produced by comparison with NIST standards.

Easy Range Identification

The colors on the HI8XXX series packaging correspond to respective buffers with standard pH values. They make it easy and safe to identify the buffers to be used.

Millesimal Calibration Solution Sachets

This series is also available in handy sachets so you have an accurate calibration per site as in the field. Single dose sachet solutions are safe, easy to carry and always fresh.



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2

pH

Solutions

pH Standard Calibration Solutions

1.68 pH Buffer Solution

4.01 pH Buffer Solution

6.86 pH Buffer Solution



1.68 pH @ 25°C - Bottles

Code	Size	Certificate of Analysis

4.01 pH @ 25°C - Bottles

Code	Size	PDA Bottles	Certificate of Analysis

4.01 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis

4.01 and 7.01 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis

6.86 pH @ 25°C - Bottles

Code	Size	PDA Bottles	Certificate of Analysis

6.86 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis

pH Standard Calibration Solutions

7.01 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI70004	500mL		•
HI70004L	1L		•
HI70007L	1L		•
HI70007L/C	1L		•
HI70009	230mL		•
HI8007L	1L	•	•
HI8007L/C	1L	•	•

7.01 pH @ 25°C and Combination Packs - Sachets

Code	Volume	Size	Package	Certificate of Analysis
HI70007T	7.01 pH	20mL	25 pcs	•
HI70007P	7.01 pH	20mL	25 pcs	
HI77700P	7.01 pH	20mL	20 pcs	
HI7007005	7.01 & 10.01 pH	20mL	10 pcs. Tray	•
HI7007001P	7.01 & 10.01 pH	20mL	10 pcs. Tray	
HI77400C	4.01 Buffer and 7.01 pH	20mL	10 pcs. Show	•
HI77401P	4.01 Buffer and 7.01 pH	20mL	10 pcs. Show	
HI77402P	7.01 and 10.01 pH	20mL	10 pcs. Show	
HI77500C	7.01 High Ionic and 12.46 pH	20mL	10 pcs. Show	•
HI77400P	4.01 & 7.01 pH	20mL	10 pcs. Tray	

9.20 pH @ 25°C - Bottle

Code	Size	Package
HI70009P	230mL	6 pcs

9.18 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI70010L	1 x 500mL		•
HI70010L/2	1L		•
HI70010L	500mL		•
HI70010L/C	500mL		•
HI70010P	230mL		•
HI8010L/2	1L	•	•
HI8010L	500mL	•	•

9.18 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI70010C	20mL	25 pcs	•
HI70010P	20mL	25 pcs	

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 demands.

9.20 pH Buffer Solution

To increase accuracy of your measurement, Hanna offers the 9.20 pH buffer solution. The label includes the batch code, expiration date and pH temperature correction table.

9.18 pH Buffer Solution

To increase accuracy of your measurement and allow automatic recognition, it is important to calibrate your instrument with the pH range and to confirm daily its ability to read your sample values. Hanna offers both pH 9.18 buffer and pH 10.01 buffer to fulfill this requirement.

FDA approved bottle

For maximum reliability, the reference solutions in bottles that meet FDA standards (US Food & Drug Administration) which protect the solutions from extended exposure to light.

Traceability with NIST Standard Reference

Hanna pH buffers are manufactured using the highest quality ingredients available and are standardized with high precision instruments traceable to NIST reference values.



2

pH

Solutions

pH Standard Calibration Solutions

10.01 pH Buffer Solution



10.01 pH @ 25°C - Bottles

Code	Size	Alu. Bottle	Certificate of Analysis
		+	+
		+	+

10.01 pH @ 25°C and Combination Packs - Sachets

Code	pH Value	Size	Package	Certificate of Analysis
				+
				+

ORP and Sample Preparation Solutions



ORP Test and Pretreatment Solution Bottles

Code	Description	Size	Certificate of Analysis

Sample Preparation Solution Bottles

Code	Description	Size

Table of Contents



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Introduction to ISE

Three Methods of Analysis

Potentiometric ion analysis with ion selective electrodes (ISEs) are performed by use of one of three methods, each involving an electrochemical cell, direct potentiometry, incremental methods, and potentiometric titration. Hanna offers a solution for each of these methods.

Direct Potentiometry

Direct potentiometry is a widely used method of performing ion analysis with ISEs. This method is highly effective when the user must quickly measure large batches of samples of varying ionic strength. Benchtop reading meters, such as the HI5000, display concentration of the unknown sample by automatically reading the calibration of the instrument with factory stored calibration curve. Slope and ionic strength adjustments are made to both samples and standards, ensuring consistent, quick and reliable measurements can be made on site without taking samples back to the laboratory.

Incremental Methods

Incremental methods are useful techniques used to determine concentration in samples whose constituents are variable or unknown. Also referred to as known addition, known increment, standard addition, or analyte addition, this method requires the user to make a known change in the sample concentration and observe the change in potential. The change in potential is then used to calculate the concentration of the sample. Hanna offers a wide range of ISEs and ISE meters that support incremental methods, including the HI4000 Ion Analyzer, HI4222 Calcium ISE, HI4102 Chloride ISE, HI4104 Fluoride ISE, HI4106 Nitrate ISE, HI4107 Potassium ISE, HI4110 Sodium ISE, HI4112 Ammonium ISE, HI4113 Lead ISE, HI4114 Copper ISE, HI4115 Cadmium ISE, HI4116 Bromide ISE, HI4117 Silver/Sulfide ISE, HI4118 Iodide ISE, HI4120 Nitrite ISE, HI4121 Calcium/Hardness ISE, HI4131 Carbon Dioxide ISE, HI4132 Cyanide ISE, HI4133 Fluoride ISE, HI4134 Sulfide ISE, HI4135 Lead ISE, HI4136 Silver ISE, HI4137 Thiocyanate ISE, HI4138 Perchlorate ISE, HI4139 Boron ISE, HI4140 Iron ISE, HI4141 Nickel ISE, HI4142 Lithium ISE, HI4143 Bromide ISE, HI4144 Iodide ISE, HI4145 Cadmium ISE, HI4146 Lead ISE, HI4147 Silver/Sulfide ISE, HI4148 Thiocyanate ISE, HI4149 Perchlorate ISE, HI4150 Boron ISE, HI4151 Iron ISE, HI4152 Nickel ISE, HI4153 Lithium ISE, HI4154 Nitrate ISE, HI4155 Potassium ISE, HI4156 Sodium ISE, HI4157 Ammonium ISE, HI4158 Calcium ISE, HI4159 Chloride ISE, HI4160 Fluoride ISE, HI4161 Nitrate ISE, HI4162 Potassium ISE, HI4163 Sodium ISE, HI4164 Ammonium ISE, HI4165 Calcium ISE, HI4166 Chloride ISE, HI4167 Fluoride ISE, HI4168 Nitrate ISE, HI4169 Potassium ISE, HI4170 Sodium ISE, HI4171 Ammonium ISE, HI4172 Calcium ISE, HI4173 Chloride ISE, HI4174 Fluoride ISE,



Reference and Combination Electrodes



Reference

Combination

Product Spotlights



Research Grade Meters with CAL Check™ and Logging

pH/ORP/ISE and EC/TDS/Resistivity/Salinity and Temperature

Measure up to 8 Parameters



Multiparameter Meter

pH/ORP/ISE and EC/TDS/Resistivity/ Salinity and Temperature



0.001 Resolution Meter

pH/ORP/ISE/°C

Product Spotlights



Waterproof Meter

pH/ORP/ISE



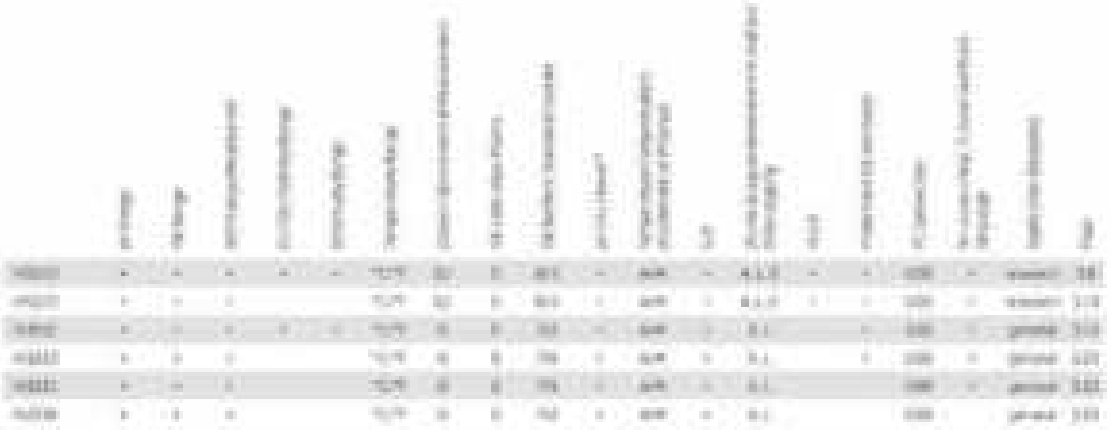
Fluoride Meter



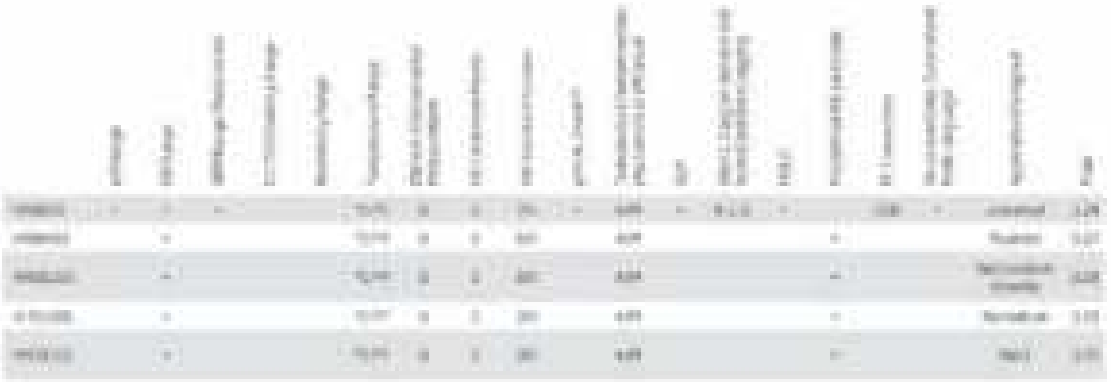
HACCP Compliant Salinity Foodcare Meter

Comparison Guides

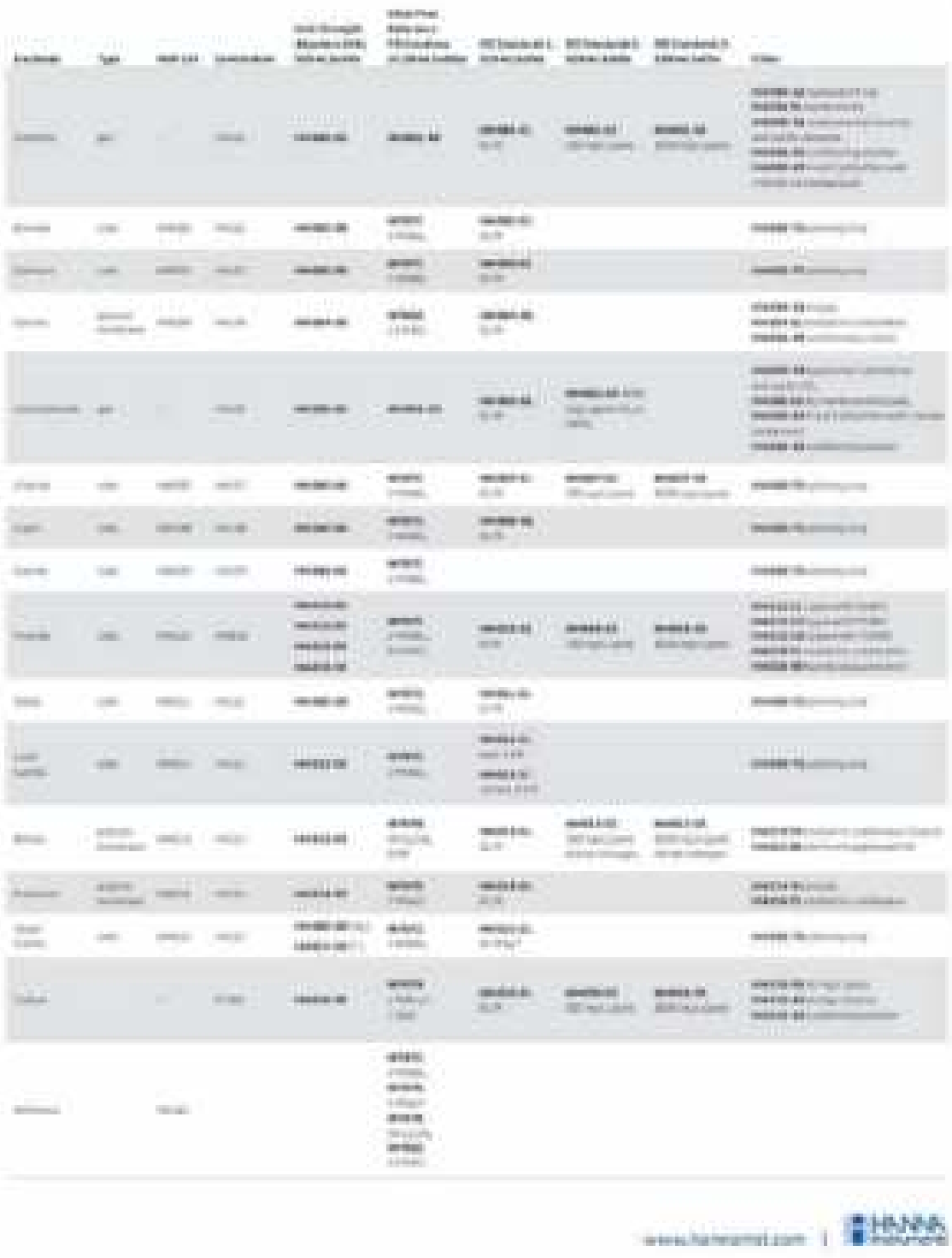
Benchtop Meters



Portable Meters



Ion Selective Sensors and Accessories Reference Chart



Research Grade Meter

pH/ORP/ISE and EC/TDS/Resistivity/Salinity and Temperature



Customizable User Interface

Color Graphic LCD

Capacitive Touch

Four Ring Conductivity Probe

Choice of Calibration

CAL Check™

GLP Data

ISE Measurement with Choice of Concentration Units

ISE Measurement with Incremental Methods

Data Logging

Data Transfer

Contextual Help

pH and EC Features

pH CAL Check™

- Each time a pH calibration is performed, the instrument compares the new calibration with the previous one. When the comparison indicates a significant difference, the message alert is for the user to either clear the electrode, check the buffer or both
- When measurement is performed for 7 hrs after calibration is due, the instrument will beep and the user will see a message on the LCD
- The condition of the pH electrode or last calibration is shown on the display, as well as the date and time
- To avoid making readings with old calibrations, the instrument automatically reminds the user when the calibration has expired



EC USP Mode



ISE Features

ISE Incremental Methods

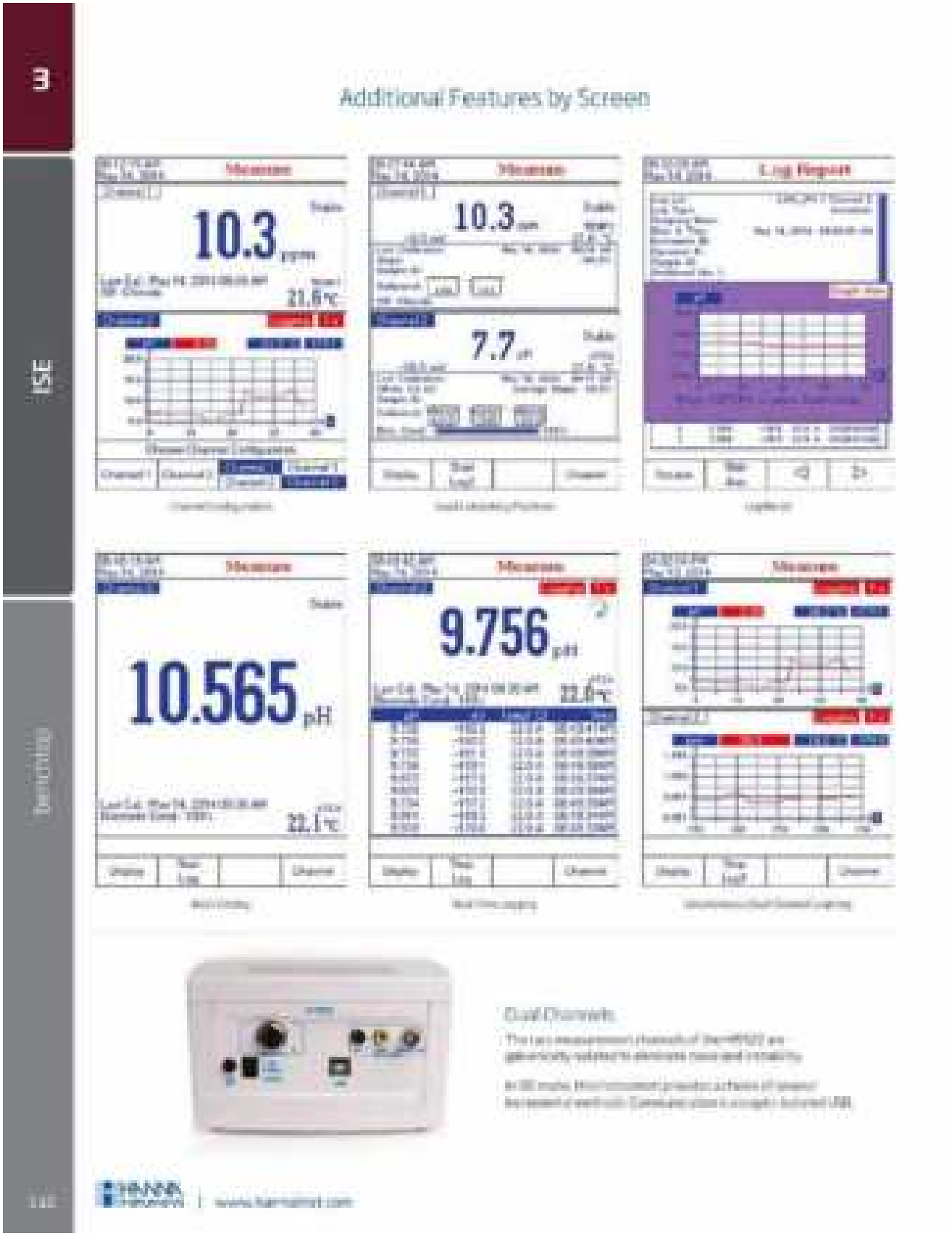


First Step

Sequence of Readings

Results




Additional Features by Screen
10.3
21.6
10.3
7.7
Log Report
10.565
pH
22.1
9.756
pH
22.6
Dual Channels



Research Grade Meter

pH/ORP/ISE and Temperature



Customizable User Interface

Color Graphic LCD

Capacitive Touch

Two Universally Isolated pH/ORP/ISE Channels

Choice of Calibration

GLP Data

CAL Check™

ISE Measurement with Choice of Concentration Units

ISE Measurement with Incremental Methods

Data Logging

Data Transfer

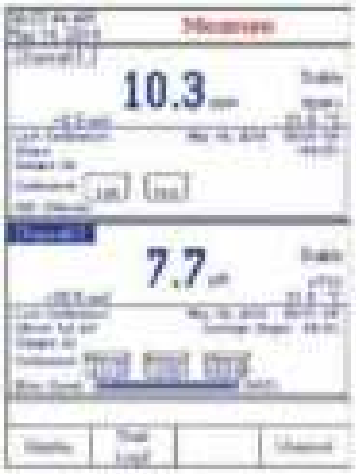
Contextual Help

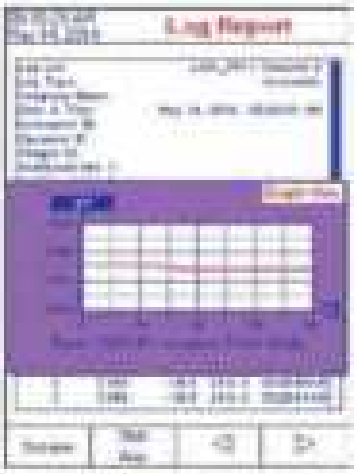
CAL Check™ Screens



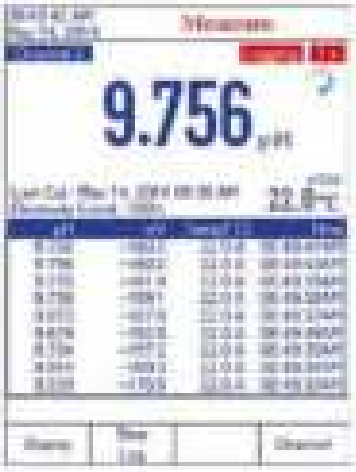
Additional Features by Screen

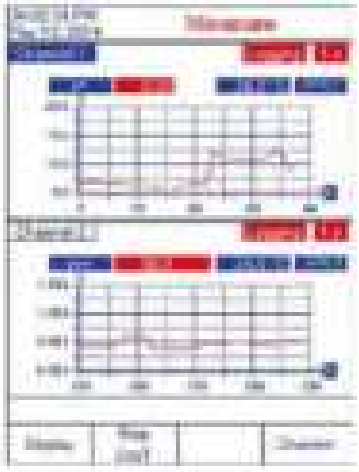














Dual Channels

The two measurement channels of the HI5221 are galvanically isolated to eliminate ground loops and increase safety.

In ISE mode, the instrument provides a choice of several measurement methods. Concentration, direct mV, ...



HI5522

Multiparameter Meter

pH/ORP/ISE and EC/TDS/Resistivity/Salinity and Temperature



- CAL Check™ feature
  - Alerts user of calibration status
- Calibration options
  - Up to five-point pH calibration and up to two-point EC calibration
- Logging
  - Automatic logging up to 500 records and logging of remaining up to 4000 samples
- Connectivity
  - PC connectivity via up to 4 channels USB
- GLP Features
  - Meter's Good Laboratory Practices

Two Channels, Eight Parameters

The HI5522 is a dual-channel benchtop meter with a graphic LCD designed to provide accurate laboratory results. Channel one measures pH/ORP/ISE and ion-selective measurement capability while channel two features conductivity, TDS, salinity or resistivity measurement, and temperature capability.

CAL Check™

Hanna's exclusive CAL Check™ diagnostic system ensures accurate readings every time by alerting users of potential problems during the calibration process. The CAL Check™ system checks electrodes and solutions during calibration. After the entire calibration process, the electrode condition is evaluated and an indicator is displayed informing the user of the overall electrode condition.

Calibration

The pH channel offers up to five-point pH calibration with seven standard buffers and up to two custom buffers.

A five-point ISE calibration using from up to six calibration standards makes this instrument very useful for a large range of ion concentrations.

The EC channel permits a two-point calibration selected from seven Hanna standards. The EC channel supports auto-ranging, manual ranging and user selected ranges as well as temperature compensation selections, temperature reference selection and temperature coefficient selection.

Total dissolved solids (TDS) factor is user-adjustable and can be set between 0.40 and 1.00.

pH and EC channels characteristic 'Out of Calibration Range' warnings and a 'Calibration Timeout' alert urge to remind the user when a new calibration is necessary.

Messages on the graphic LCD offer directions for easy and accurate calibration for both channels, as well as diagnostics to alert the user when calibration or measurement issues are detected.

Additional Features

Other features of the HI5522 include log on demand of up to 4000 samples, automatic logging interval with log on stability of up to 500 records, Autorecall to freeze the first stable reading on the LCD display, GLP to view the last calibration data for pH sensor, ISE, EC or salinity, and a PC interface via USB.



pH Benchtop Meters

pH/mV/ISE and Temperature



Up to 4 Parameters, Single and Dual Channel

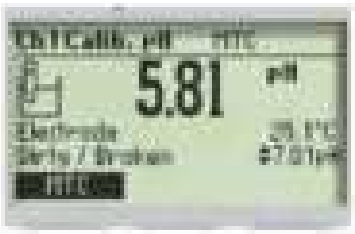
CAL Check™

On-screen User Support

CAL Check™ Features







- Calibration
  - pH calibration features detailed CAL Check™ technology. Users are guided through the calibration procedure with step-by-step on screen instructions

Specifications		HI5221	HI5222
pH	Range		
	Resolution		
	Accuracy		
	Calibration		
	Temperature Compensation		
mV	Range		
	Resolution		
	Accuracy		
	Relative mV (Rel) Range		
Temperature*	Range		
	Resolution		
	Accuracy		
ISE	Range		
	Resolution		
	Accuracy		
	Calibration		
General Specifications			
Shipping Information			

*Temperature probe not included

0.001 Resolution Meter

pH/ORP/ISE/°C



Up to Two-Point GLP Calibration

HI1131B pH Electrode

Temperature Compensation

Good Laboratory Practice (GLP)

Calibration Reminder

mV Mode

Simple User Interface

Up to Five-Point pH Calibration



Professional Waterproof Meters

pH/ORP/ISE



Designed for professionals



Backlit Graphic LCD Display

Waterproof Protection



ISE Sensors and Calibration



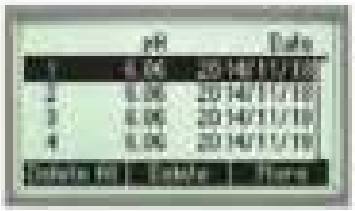
pH Calibration

Enhanced Calibration

CAL Check™



GLP



Data Logging

Intuitive Keypad

AutoHold

Dedicated Help Key



Setup screen

PC Connectivity

Long Battery Life



Rugged Custom Carrying Case







Fluoride Meter

- IP67
  - Automatic Temperature Compensation
- Rugged design
  - Water-proof, rugged housing for both indoor and outdoor applications
- Many Features
  - Colorful messages on LCD display

The HI 98402 measures Fluoride from 0.00 mg/L to 2.0 g/L in five distinct ranges. The HI 98402 utilizes an electrode requiring the pH to be manually set prior to the range that provides the best resolution.

The HI 98402 automatically corrects readings for temperature from 0 to 60°C using the optional HI 7662 stainless steel temperature probe. Both the temperature and fluoride concentration are displayed on the large LCD.

Calibration is successful on one or two points. The calibration points can be chosen among 1 mg/L, 2 mg/L, 10 mg/L, 100 mg/L and 1000 mg/L.

The HI 98402 is supplied in a rugged carrying case complete with calibration fluid (enough for up to 200 measurements), electrode and operation manual.

Specifications		HI 98402
Fluoride	Range	0.00 to 19.99 mg/L (ppm) / 20.0 to 199.9 mg/L / 200 to 1999 mg/L / 2.00 to 19.99 g/L
	Resolution	0.01 mg/L (ppm) / 0.1 mg/L / 1 mg/L / 0.01 g/L
	Accuracy	±10% of reading or ±0.02 mg/L (ppm) (whichever is greater) after calibration
Temperature	Range*	0.0 to 60.0°C (32.0 to 140.0°F)
	Resolution	0.1°C or 1°F
	Accuracy	±0.5°C (±1.0°F) after calibration
Additional Specifications	Calibration	automatic from one to two points at 1 mg/L, 2 mg/L, 10 mg/L, 100 mg/L and 1000 mg/L
	Temperature Compensation	automatic, 0 to 60°C (32 to 140°F) with optional probe
	Electrodes	HI 4107 Fluoride ion selective electrode with 1 m (3.3') cable (with connector) and HI 4110 double junction reference electrode (with connector)
	Temperature Probe	HI 7662 stainless steel temperature probe with 1 m (3.3') cable (with connector)
	Auto-shutdown	5, 15, 30, 60 minutes
	Battery Type / Life	4 x 1.5V AAA (included) / approximately 200 hours (without backlight)
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions	195 x 70 x 40 mm (7.7 x 2.8 x 1.6")
	Weight	180 g (6.3 oz)
Ordering Information		HI 98402 Fluoride meter with electrode, calibration solutions and instructions

* Temperature probe not included

www.hannainst.com | HANNA instruments

3

ISE

controller

ELAB

Sodium Chloride and Sodium Content Meters





HACCP Compliant Salinity Foodcare Meter

Ion Selective Electrodes

Ammonia · Bromide · Cadmium



Parameter	Ammonia	Bromide		Cadmium	

Ion Selective Electrodes

Calcium · Carbon Dioxide · Chloride



Parameter	Calcium		Carbon Dioxide	Chloride	
Code	HI4104	HI4004	HI4105	HI4107	HI4007
Type	calcium ion selective electrode, refillable	calcium ion selective electrode, combination	gas sensing combination	solid state, refillable	solid state combination
Measurement Range	1 to 40 g/L (1 to 40 ppt) 25 to 1000 mg/L (ppm)		0.22 to 2.2 g/L (220 to 2200 mg/L (ppm))	1.8 to 35.5 g/L (1.8 to 35.5 mg/L (ppm))	
Optimum pH Range	4 to 11	4 to 11	5.5 to 6.5	2 to 11	2 to 11
Temperature Range	0 to 80°C	0 to 80°C	0 to 50°C	0 to 80°C	0 to 80°C
Ideal Sample Stirring	+HI	+HI	+HI	-HI	-HI
Body O.D.	12 mm	12 mm	12 mm	12 mm	12 mm
Insertion Length	120 mm	120 mm	120 mm	120 mm	120 mm
Epoxy Resistance	approx 1 MΩ	1 MΩ	1 MΩ	epoxy	1 MΩ
Cable	1 m coaxial	1 m coaxial	1 m coaxial	1 m coaxial	1 m coaxial
Recommended Meters	pH/ISE meters or ISE only meters with manual and automatic		pH/ISE meters or ISE only meters with manual and automatic	pH/ISE meters or ISE only meters with manual and automatic	
Connection	BNC	BNC	BNC	BNC	BNC

Ion Selective Electrodes

Cupric - Cyanide



Parameter	Cupric		Cyanide	
Item				
Type				
Measuring Range				
Concentration Range				
Temperature Range				
Temperature Compensation				
Body O.D.				
Insertion Depth				
Body Material				
Cable				
Recommended Applications				
Connection				

Ion Selective Electrodes

Fluoride - Iodide



Parameter	Fluoride			Iodide	
Code	HI 4104	HI 4124	FC 232B	HI 4112	HI 4132
Type	Gel filled, Half cell	Gel filled, Combination	Liquid filled, Half cell	Gel filled, Half cell	Gel filled, Combination
Temperature Range	0 to 80°C (32 to 176°F) Use above 50°C (122°F) only for short periods			0 to 80°C (32 to 176°F) Use above 50°C (122°F) only for short periods	
Measurement Range	0 to 19 ppm	0 to 19 ppm	0 to 19 ppm	0 to 126.9 ppm	0 to 126.9 ppm
Measurement Range	0 to 1000 mV	0 to 1000 mV	0 to 1000 mV	0 to 1000 mV	0 to 1000 mV
Operating Temperature	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)
Body Diameter	12 mm (0.5")	12 mm (0.5")	12 mm (0.5")	12 mm (0.5")	12 mm (0.5")
Cable Length	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Body Material	Epoxy	PEI (Ultem)	Epoxy	Epoxy	PEI
Tip	Flat	Flat	Flat	Flat	Flat
Recommended Applications	Water analysis of Total Fluoride in accordance with ASTM D1179-10, Method A, and ISO 10359-1			Water analysis of Total Iodide in accordance with ASTM D4327-11	
Connector	BNC	BNC	BNC	BNC	BNC

Ion Selective Electrodes

Lead/Sulfate · Nitrate · Potassium



Parameter	Lead/Sulfate		Nitrate		Potassium	
Model	HI4002	HI4112	HI4003	HI4113	HI4004	HI4114
Type						
Measurement Range						
Optimum pH Range						
Temperature Range						
Approximate Slope						
Body O.D.						
Insertion Depth						
Body Material						
Cable						
Possible Applications						
Connector						

Ion Selective Electrodes

Silver/Sulfide · Sodium · Reference



Description	Silver/Sulfide		Sodium	Reference
Code	HI4113	HI4112	FC200	HI4110
Type	solid-state/epoxy	solid-state/epoxy	glass/epoxy	N/A
Measurement Range	1 x 10⁰ to 1 x 10⁻⁷ M (26,000 to 3 ppm Ag) 1 x 10⁰ to 1 x 10⁻² M (10,800 to 1,080 ppm S²⁻)	Ag+: 1 x 10⁰ to 1 x 10⁻⁷ M (107,900 to 1 ppm) S²⁻: 1 x 10⁰ to 1 x 10⁻⁷ M (32,000 to 0.032 ppm)	1 x 10⁰ to 1 x 10⁻⁶ M (23,000 to 0.023 ppm)	N/A
Optimum pH Range	2 to 8 (Ag+) 12 to 14 (S²⁻)	Ag+: 2 to 8 S²⁻: 12 to 14	4 to 9 (Na+)	N/A
Temperature Range	0 to 80°C	0 to 80°C	0 to 50°C	0 to 80°C
Application Class	Ion Selective	Ion Selective	Ion Selective	N/A
Body Size	12 mm	12 mm	12 mm	12 mm
Insertion Length	120 mm	120 mm	120 mm	120 mm
Body Material	epoxy	PEI	glass	PEI
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	ideal for use with Hanna Ag+ and S²⁻ ISE solutions for the determination of Ag+ and S²⁻ in aqueous samples		stable Na+ potential for easy and long term use in all Na+ applications	ideal for use with Hanna ISE solutions for the determination of Ag+ and S²⁻ in aqueous samples
Connection	BNC	BNC	F (HI4200, HI4201, HI4202, HI4203): BNC F (HI4204, HI4205): DIN F (HI4206): US	BNC

Solutions

ISE Standards

Our wide selection of Ion-ISE Standards are made and tested in our own color QA lab at Hanna Romania. Quality ISE Standards are required for direct and accurate measurement results and are available with certificate of analysis.

Code	Description	Size
HI4001-01		
HI4001-02		
HI4001-03		
HI4002-01		
HI4003-01		
HI4004-01		
HI4005-01		
HI4005-03		
HI4007-01		
HI4007-02		
HI4007-03		
HI4008-01		
HI4009-01		
HI4010-01		
HI4010-02		
HI4010-03		
HI4010-12		
HI4010-13		
HI4010-14		
HI4010-20		
HI4011-01		
HI4012-01		
HI4012-11		
HI4013-01		
HI4013-02		
HI4013-03		
HI4014-01		
HI4015-01		
HI4016-01		
HI4016-02		
HI4016-03		
HI4016-10		

Gas Sensor PE Solutions

Code	Description	Size
HI4001-00		
HI4002-00		

Specific Solutions for ISE Sensors

Code	Description	Size
HI4004-01		
HI4004-02		
HI4004-03		
HI4010-00		
HI4010-01		
HI4010-02		



Ionic Strength Adjusters (ISA)



Silver-free Reference Fill Solutions



Reference Fill Solutions Containing Silver Chloride (AgCl)

Solutions

Sodium (Na^+) ISE Standard Solutions

Code	Description	Pack size
[illegible]	[illegible]	[illegible]

Sodium Chloride ($NaCl$) Standard Solutions

Code	Description	Pack size
[illegible]	[illegible]	[illegible]

[illegible]

Fluoride Standard Solutions

Code	Description	Bottle
[illegible]	[illegible]	[illegible]

Accessories

[illegible]	[illegible]

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HI931 Automatic Titration System 4.8
HI932 Automatic Titration System 4.10
HI933 Automatic Titration System 4.12
HI933 Karl Fischer Volumetric 4.14
HI934 Karl Fischer Coulometric 4.16
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Total Titratable Alkalinity 4.22
Titratable Acidity for Dairy Products 4.24
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Sulfur Dioxide 4.30
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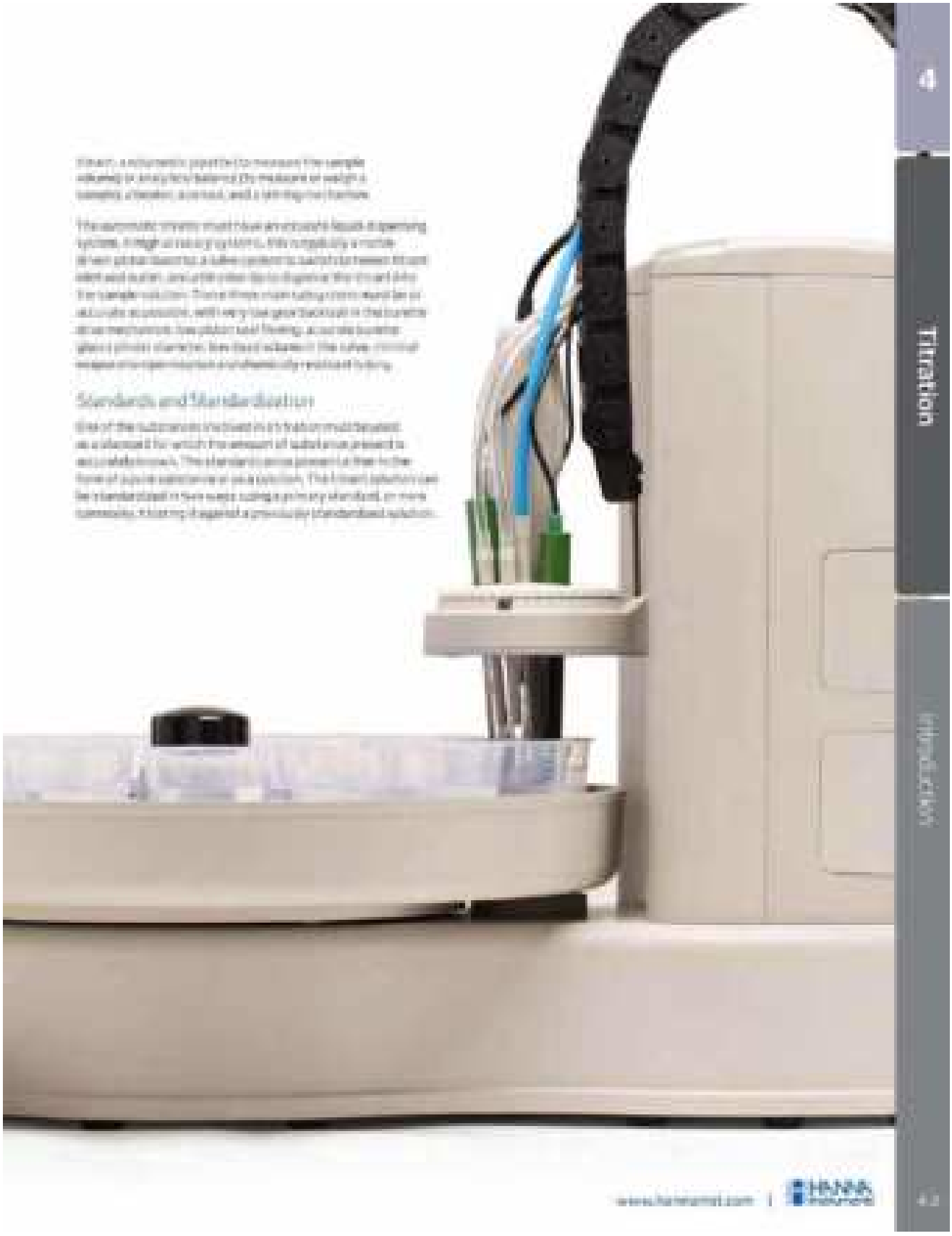
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Meter Specific Accessories and Reagents 4.43

Hanna Instruments® Titration Systems

Automatic Titration





Product Spotlights

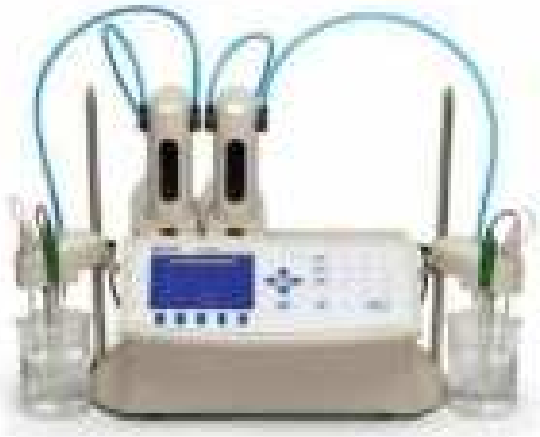
Autosampler



Karl Fischer Coulometric Titrator



Automatic Titration System





Titratable Acid Mini Titrator and pH Meter for the Dairy Industry



Total Titratable Acidity Titrator and pH Meter

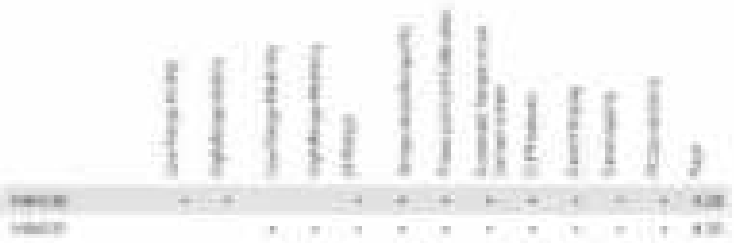


Titratable Alkalinity Titrator and pH Meter

Mini Titrator Comparison Guides

Total Titratable Acidity and Titratable Alkalinity Automatic Benchtop Mini Titrators





Dairy Products Automatic Benchtop Mini Titrator





Mini Titrator Comparison Guides

Acidity in Fruit Juice Automatic Benchtop Mini Titrator



Wine Products Automatic Benchtop Mini Titrators



Automatic Titration System



Burettes and Dosing System



Exchangeable Burette System

Multiple Burette Sizes

Linear and Dynamic Dosing

Precision Dosing Pump

Chemically Resistant Tubing

Titration Capabilities

Dynamic Titrant Dosing

Signal Stability Timing

Equivalence Endpoint Detection

Multiple Equivalence Point Detection

Method Sequencing

Multiple Titration Types

Interface and Display

Detailed Titration Graphs

Interactive Color Display

Simple and Quick Navigation

Data and Storage

Customizable Titration Reports

Flexible GLP Management



Effortless Data Transfer

Methods of Analysis

Customizable Methods

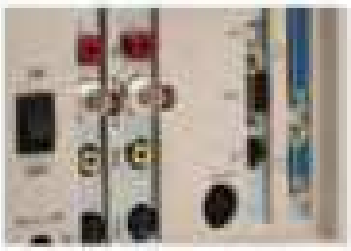
Titration Method Support

Market Specific Methods Packs

Adaptable Standard Methods

Connectivity and Functionality

Multifunctional with Four Working Modes



Multiple Connections

Autosampler Connectivity

Multiple Peripherals

4

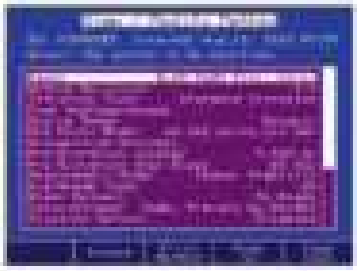
Titration

Versatile Data Management



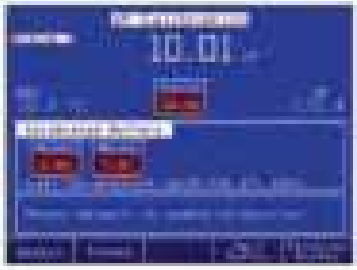




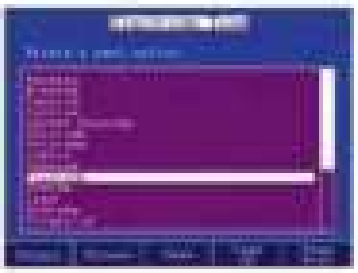












4.63



Autosampler



Automate up to 18 samples

15 or 18 Sample Tray

Built-in Magnetic Stirrer

Built-in RFID

Absolute Encoder

Barcode Reader

Optical IR Beaker Detection

Versatile Electrode Holder

Electrode Rinse Feature

Sample Leveling Feature

Waste Retrieval Feature

Use with the HI932 Automatic Titration System



Control Panel



Peristaltic and Membrane Pumps

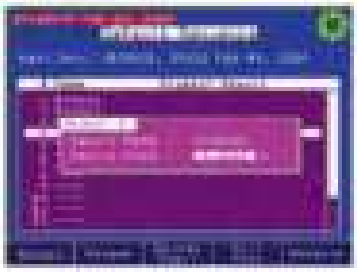
Status indicator lights















Specifications	HI921
Electrode/Probe Holes	2 for 12 mm (0.47") electrodes 1 temperature probe 1 dosing tube
Temperature Sensor	NTC30kΩ for automatic
Display	Dot matrix graphic LCD with backlight
Keyboard	Membrane keypad
Power Supply	12 VDC wall adapter
Dimensions	190 x 190 x 120 mm (7.5 x 7.5 x 4.7")
Weight	1.2 kg (2.6 lb)

Ordering Information	
HI921 –	

4

Titration

Automatic Titration System



On-screen Features







Keep an Accurate Record of Analyses

Powerful Customization, Accurate Analysis









Clip-Lock™ Exchangeable Burette System





Karl Fischer Volumetric Titrator

for Moisture Determination



Measures 100 ppm to 100% water content

Burette and Dosing System

Precision Dosing Pump



Anti-Diffusion Dispensing Tip

Chemically Resistant Tubing and Syringe

Titration and Solvent System

Efficient Sample Handling

Chemically Resistant Titration Vessel

Sealed Solvent System

Visually Recognizable Desiccant



Titrator Capabilities

Dynamic Titrant Dosing

Drift Rate Compensation

Titration Results Averaging

Titrant Recalibrating

Selectable Endpoint Criteria

Multistage Cell Preparation

Interface and Display

Detailed Titration Graphs

Interactive Color Display

Simple & Quick Navigation

Data and Storage

Customizable Titration Reports

Flexible GLP Management

Effortless Data Transfer

Methods of Analysis

Customizable Methods

Titration Method Support

Adaptable Standard Methods

Connectivity and Functionality

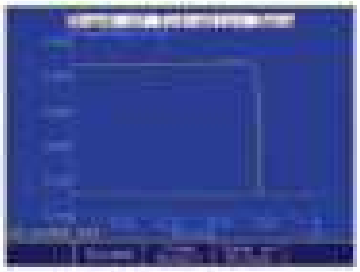
Configurable Balance Interface

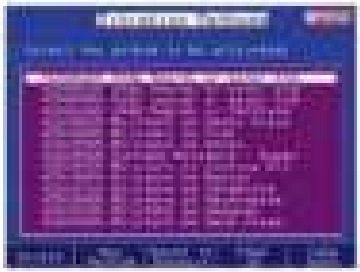
Multiple Peripherals

Versatile Data Management









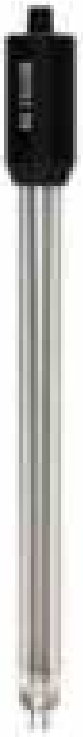












Karl Fischer Coulometric Titrator



Measures 1 ppm to 5% water content

Coulometric Reagent System

Precision and Fine Corrections

Titration and Solvent System

Chemically Resistant Titration Vessel and Tubing

Solvent Solvent System

Molecular Sieve Desiccant

Built-in Stirrer

Titrator Capabilities

Dynamic Titrant Dosing

Drift Rate Compensation

Titration Results Averaging

Selectable Endpoint Criteria

Multistage Cell Preparation

Interface & Display

Detailed Titration Graphs

Interactive Color Display

Simple and Quick Navigation

Data & Storage

Customizable Titration Reports

Flexible GLP Management

Effortless Data Transfer

Methods of Analysis

Customizable Methods

Titration Method Support

Adaptable Standard Methods

Connectivity and Functionality

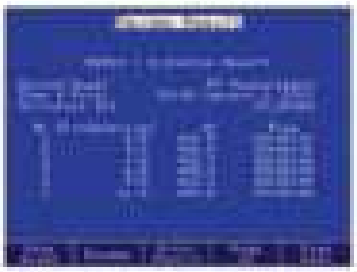
Configurable Balance Interface

Multiple Peripherals



Versatile Data Management









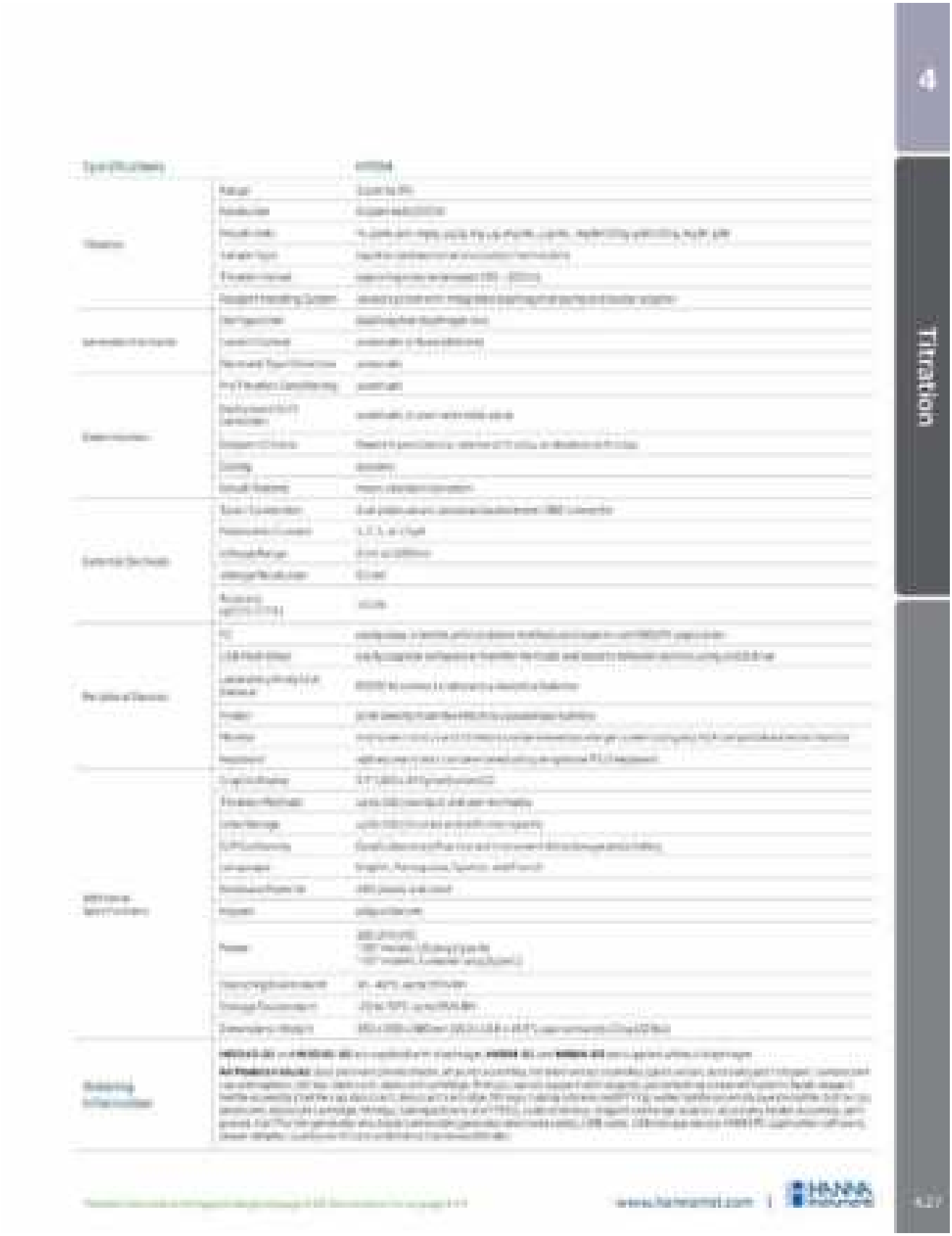












Total Titratable Acidity Titrator and pH Meter

for Water Analysis



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

Total Titratable Acidity

On-screen Features







- Titrating with a single parameter
  - The HI931410 is a single parameter titrator designed to measure total alkalinity in three easy steps. The HI931401 displays the results directly on the screen in user-selectable units.
- pH meter with differentiation conditions on display
  - The HI931410 also functions as a pH meter. The HI931401 also displays the electrode condition on the LCD using patented exclusive electrode diagnostics.
- Titration curve displayed on screen
  - The HI931401 offers real-time graphing of the titration curve on the LCD.

Titration		
pH Meter		
ion Meter		
Temperature		
Monitoring & Specifications		

Titratable Alkalinity Titrator and pH Meter

for Water Analysis



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

Total Alkalinity

On-screen Features







Titratable Acidity Mini Titrator and pH Meter

for the Dairy Industry



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

Acidity Measurement and its Significance in the Dairy Industry



4

Titration

Titratable Acidity Mini Titrator and pH Meter

for Fruit Juice



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

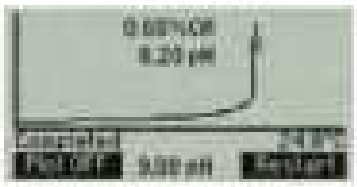
The Importance of Titratable Acidity

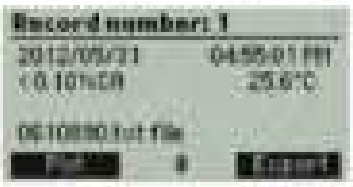
On-screen Features

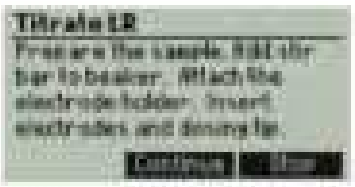












Titration		
pH Meter		
mV Meter		
Temperature Meter		
Additional Specifications		
Shipping Contents		

Formol Number Mini Titrator and pH Meter

for Wines and Fruit Juices

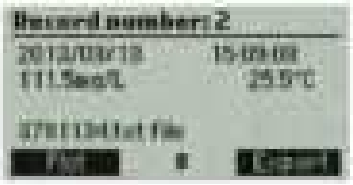


An Easy-to-Use, Fast and Affordable All-in-one Solution

Why Formol Number is an Important Determination

On-screen Features







- The GLP feature records calibration data to help keep measurements accurate and reliable.
- The HI 4521 can log up to 400 samples (200 for titration results). Data can be downloaded to a USB drive or PC.
- The HI 4521 offers real time graphing of the titration curve on the LCD.

Titration		
pH Meter		
	Range	
	Resolution	0.1 pH
	Accuracy	
Temperature		
	Range	
	Resolution	0.1°C
	Accuracy	
General Specifications		
	Logging Data	
	pH Calibration	
	Temperature Probe	
	Environment	
	Power Supply	12 V DC adapter (included)
	Dimensions	
	Weight	
Ordering Information		

Sulfur Dioxide Mini Titrator

for Wine Analysis



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

Why Free & Total Sulfur Dioxide is Important

Application-specific ORP Electrode

On-screen Features













Total Acidity Mini Titrator and pH Meter

for Wine Analysis



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

The Significance of Titratable Total Acidity

On-screen Features







- ADLChek2™
  - A Pharmacopoeia guide to facilitate checking the condition of electrodes which helps keep instrumentation operation

- Titration Curve Displayed On Screen
  - The HI84532 offers visual titrant guiding of the titration curve on the LCD

- Logged Stored Data
  - Log up to 800 samples (200 for titration results, 200 for pH/mV and 400 for temperature) to USB stick or PC

Specifications		HI84532
Titration	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
	Method	
	Titration Criteria	
	Endpoints	
	Titration speed	
	Dosing Speed	
pH	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
	Calibration	
	Temperature Compensation	
mV (Redox)	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
Temperature	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
General Specifications	Weight (g/oz)	
	pH Electrode	
	Temperature Probe	
	Conductivity Cell	
	Power Supply	
	Dimensions	
	Weight	
Ordering Information		



Meter Accessories and Reagents





HI902C and HI931 Automatic Titration System Accessories

Accessory Code	Description
HI931100	
HI931110	
HI931111	
HI931112	
HI931113	
HI931201	
HI931210	
HI931211	
HI931212	
HI931301	
HI931302	
HI931303	
HI931310	
HI931312	
HI931313	
HI931314	
HI931315	
HI931316	
HI931317	
HI931318	

HI925 Autosampler Accessories

Accessory Code	Description
HI925 11060	
HI925 050	
HI925 11061	
HI925 051	
HI925 052	
HI925 100	
HI925 101	
HI925 102	
HI925 103	
HI925 104	
HI925 105	
HI925 106	
HI925 111	
HI925 112	
HI925 150	
HI925 151	
HI925 152	
HI925 153	
HI925 154	
HI925 155	
HI925 156	
HI925 157	
HI925

Meter Accessories and Reagents





HI903 KF Volumetric Titrator Accessories

Accessory Code	Description
HI931000	
HI931001	
HI931005	
HI931010	
HI931011	
HI931012	
HI931013	
HI931014	
HI931015	
HI931016	
HI931017	
HI931018	
HI931019	
HI931020	
HI931021	
HI931022	
HI931023	
HI931024	
HI931025	
HI931026	
HI931027	
HI931028	
HI931029	
HI931030	
HI931031	
HI931032	
HI931033	
HI931034	
HI931035	

HI904 KF Coulometric Titrator Accessories

Accessory Code	Description
HI904001	
HI931001	
HI904002	
HI904003	
HI904004	
HI904005	
HI904006	
HI904007	
HI904008	
HI904009	
HI904010	
HI904011	
HI904012	
HI904013	
HI904014	
HI904015	
HI904016	
HI904017	
HI904018	
HI904019	
HI904020	
HI904021	
HI904022	
HI904023	
HI904024	
HI904025	





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

Reagent Code	Description
[illegible]	

Accessory Code	Description
[illegible]	

HI84532 Titratable Alkalinity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
[illegible]	

Accessory Code	Description
[illegible]	





HI84529 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]

HI84532 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]





HI84532 Formol Number Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]

HI84100 Sulfur Dioxide Mini Titrator for Wine Analysis Reagents and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]

Meter Accessories and Reagents



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

Reagent Code	Description
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

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Conductivity/TDS Meters Introduction

Definition of Conductivity

Units of Measurement

Conductivity versus Resistivity

TDS

Conductivity/Resistivity/TDS of Commonly Measured Substances

Sample at 25°C	mS/cm	µS/cm	mS/m	TDS
Ultrapure Water	0.055	55.0		
Tap Water Santa Maria	0.2	198		97 ppm
Drinking Water		500-800	50 to 120	250 to 400 ppm
Ocean Water		53,000	5300	35.00 g/L
Milk		5000	500	3.00 g/L
Soil sample		2,000	200	
0.01 M KCl		1,408	141	
pH 7.0		84,000	840	
1.0% HCl		110,000	900	
4.0% HCl		190,000	1900	
80% H_2SO_4		865,000	7400	

Salinity

Conductivity/TDS Meters Introduction

Conductivity and Temperature

Typical Temperature Coefficients of Various Solutions

Sample	Percent / °C

(USP) United States Pharmacopeia Compliant Conductivity

Conductivity Calibration

Types of Conductivity



edge®EC

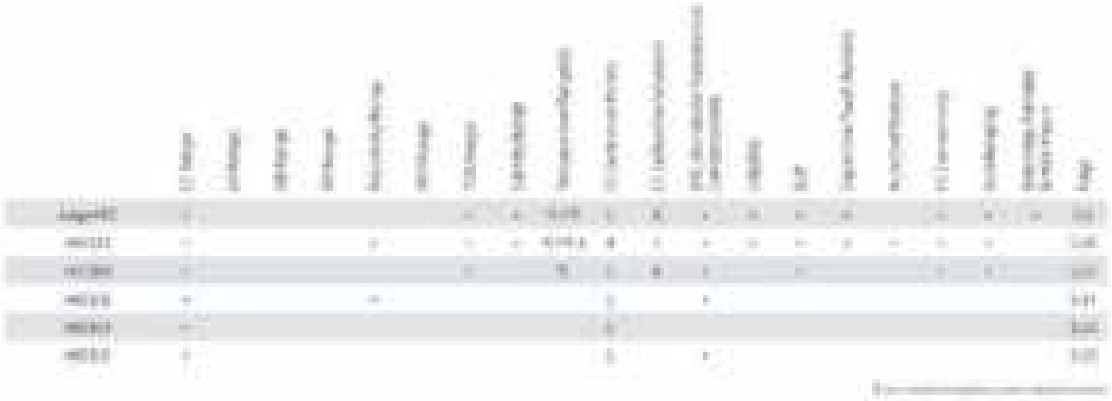


Research Grade EC/ TDS/ Resistivity/Salinity and Temperature Meter with USP <645>

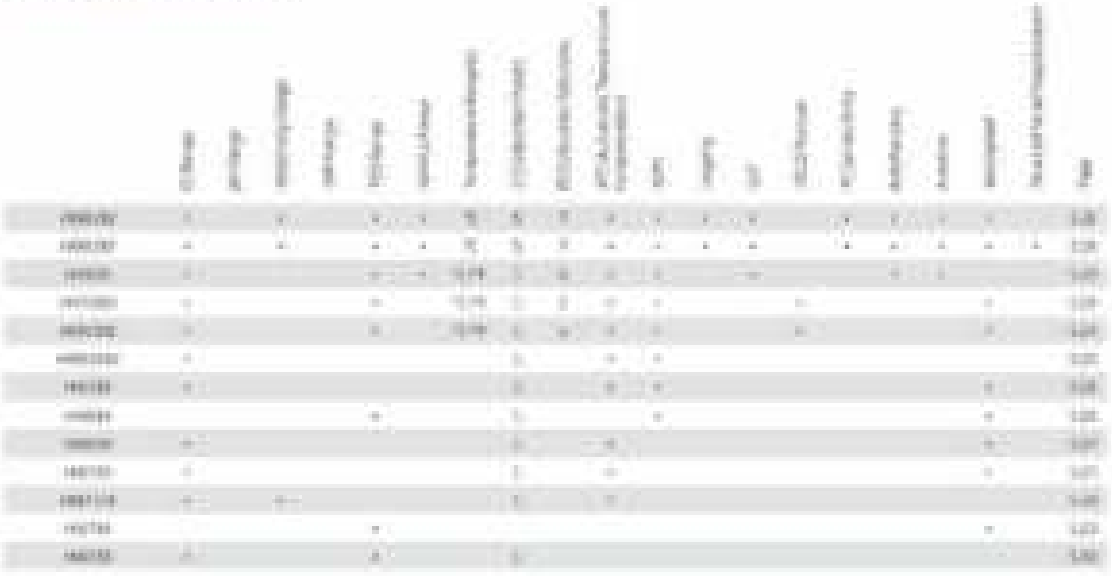


Graphic Display EC/ Resistivity/TDS/NaCl Meter

Benchtop Meters



Portable Meters



edge® EC



edge® EC–Innovation in a Single Parameter

edge EC's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world-class R&D. edge® is an ergonomic, user-friendly EC, TDS, and temperature

Additional feature information

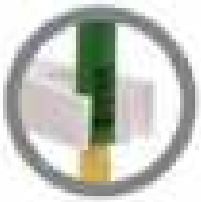
- Digital four-segment conductivity probe
  - Covers all ranges from 0.000 µS/cm to 100 mS/cm (absolute EC)
- Accuracy
  - ± 2% of the reading (±0.01 µS/cm) or ± 2 digit, whichever is greater)
- Calibration
  - Offset (0 µS/cm) and/or Factor calibration
  - Choice of 5 calibration buffers recognition
- Data logging
  - Manual log on demand
  - Manual log automatically
  - Interval logging
- GLP data
  - Recall date, time, offset and slope for last calibration
  - Data of the last performed calibration is stored in the probe: date, time, cell constant, temperature coefficient, individual buffers and slope for previous calibrations. When the probe is connected to edge® EC, GLP data is automatically recalled
- Auto ranging or manual range selection
- EC, TDS and salinity reading modes
- Temperature compensation
  - Automatic
  - Off (Uncompensated)
- Adjustable EC to TDS conversion factor
- Adjustable temperature coefficient (beta)
- Selectable salinity units
  - PSU
  - PPT
  - g/L

edge EC technical features







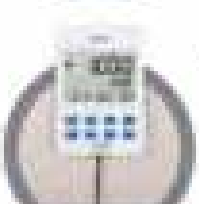




edge EC design features











Accepts edge® compatible EC probes

0	0.5	8.8	8	5.5	2

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5

Conductivity / TDS

A hybrid meter that can be used in portable, wall-mount and bench-top configurations







Digital electrodes



Conductivity probe



Specifications		edge® EC
EC	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
	Calibration	
	Temperature Specifications	
TDS	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
	Calibration	
	TDS Factor	
Salinity*	Range	
	Resolution	
	Accuracy (@20°C/68°F)	± 1% of reading
	Calibration	
Temperature	Range*	
	Resolution	
	Accuracy	
General Specifications	Probe	
	Display	
	Connectivity	
	Power Supply	
	Dimensions	
	Weight	
Ordering Information		

Research Grade Conductivity/TDS Meter

EC/TDS/Resistivity/Salinity and Temperature with USP <645>



Customizable User Interface

Color Graphic LCD

Capacitive Touch

Auto-ranging

Automatic Temperature Compensation

Calibration

GLP Data

Data Logging

Data Transfer

Contextual Help

Four-ring Conductivity Probe



Type of Probe		HI7033
EC	Range	
	Resolution	
	Accuracy	
	Cell Constant	
	Cell Type	4-ring conductivity
	Calibration	
	Calibration Reminder	yes
	Temperature Compensation	
	Temperature Compensation	
	Reference Temperature	
	Auto-Ranging	yes
	GLP Capability	yes
TDS	Range	
	Resolution	
	Accuracy	
Salinity	Range	
	Resolution	
	Accuracy	
	Range	
	Resolution	
	Accuracy	
Temperature**	Range	
	Resolution	
	Accuracy	
Additional Specifications	EC Probe	
	GLP	
	Logging	
	PC Connectivity	USB
	Power Supply	12 VDC wall adapter (included)
	Environmental	
	Dimensions / Weight	
Ordering Information		

Autoranging Bench Meter

EC, TDS, Salinity and Temperature



Temperature Compensation

Data Logging

Data Transfer

Adjustable TDS Factor

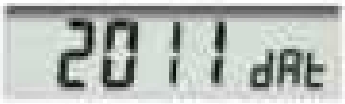
Four-ring EC Probe

Calibration

GLP Data

On-screen Features











EC and Resistivity Meter



Four-ring EC Probe

Resistivity Probe

Temperature Compensation

Calibration

Large LCD

Built-in Solution Holders



Conductivity Meter

Four-ring EC Probe

Temperature Compensation

Calibration

Large LCD

Built-in Solution Holders

EC	Range		
	Resolution		
	Accuracy (@20°C/68°F)		
Additional Specifications	Calibration		
	Temperature Compensation		
	Probe		
	Power Supply		
	Environment		
	Dimensions		
	Weight		
Ordering Information			

5

Conductivity / TDS

Professional Waterproof Meters

EC/TDS/Resistivity/Salinity Meter with USP <645>



For Universal Applications



Backlit Graphic LCD Display

Waterproof Protection



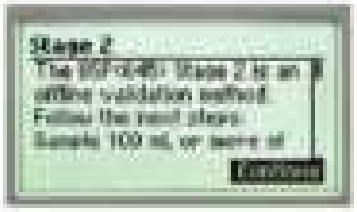
Quick connect probe

Calibration

Measurement

USP <645>









Data Logging



GLP

Intuitive Keypad

Autohold

Dedicated Help Key

Setup screen

PC Connectivity

Long Battery Life





Professional Waterproof Meter

for Ultrapure Water

- Conductivity and resistivity
  - High resolution of 0.001 µS/cm for conductivity and 0.1 MΩ/cm for resistivity
- Calibration
  - Perform up to a five point calibration for enhanced accuracy
- Temperature compensation
  - Automatic Temperature Compensation
  - Configurable temperature coefficient (α) over a range from 0.00 to 10.00 %/°C
- Operates with four AAA batteries or AC
  - Powered by HI 710 AA batteries
- Measuring conductivity or resistivity
  - Fully probe can measure from 0 µS/cm to 1000 mS/cm (or not RO)
- Waterproof
  - IP67 and floats overboard, rugged and secure
- Clear display
  - Bright, LCD display with multi-function virtual keys
- Automatic
  - Automatically sends the first stable reading on the display
- Out of calibration range
  - An "out of calibration range" warning (or GLP) if the measured range is not covered by the current calibration
- Calibration reminder
  - Alarm when it's time for a calibration based on a specified interval
- Connectivity
  - PC connectivity via mini-USB, micro-USB with HI92000 software
- Data logging
  - The HI 2020 (desktop) or HI 2030 (portable) can store up to 400 log sets of standard samples or 1000 for logging samples that can be later downloaded to a PC with the included USB cable and software
- GLP
  - GLP data provides information from previous calibrations to assist Good Laboratory Practices (GLP)
- Meets or exceeds
  - Most of the available options, such as GLP, auto-read, time, range, calibration, and backlight have a dedicated button

For Ultrapure Water Applications

HI 98192 is a waterproof, portable EC (conductivity) and TDS (total dissolved solids) meter that has an expanded conductivity range from 0.000 µS/cm to 400.0 mS/cm, as well as TDS (total dissolved solids), resistivity and three salinity scales. This meter offers 5 auto-connect non-linear probes and allows the user to adjust the nominal cell constant. HI 98192 is also ready to perform all three stages of USP <645> water conductivity testing for EC measurement of water for injection.

Designed for Water Professionals







Backlit Graphic LCD Display



Waterproof Protection

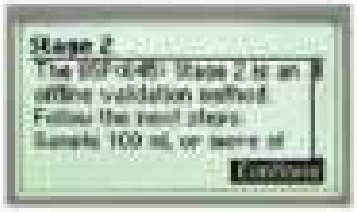
Quick connect probe

Calibration

Measurement

USP <645>









Data Logging



GLP

Intuitive Keypad

Autohold

Dedicated Help Key

Setup screens

PC Connectivity

Long Battery Life



Supplied complete



EC/TDS/Salinity/°C Meters

- EC
  - Automatic temperature compensation
- Memories
  - Recalls last EC/TDS/Salinity/Temperature reading
- Battery Error Prevention System (BEPS)
  - Alerts to the use of low battery power that could adversely affect readings
- Battery Indicator
  - Battery life indicator on display
- Hold Function
  - On-screen confirmation
- Backlight
  - Backlit, graphic LCD display

The HI9813 is a handheld EC/TDS/Salinity/temperature meter. Given and provided with a variety of diagnostic features and messages on the LCD which help guide the user through operation and troubleshooting.

Conductivity and TDS measurement parameters are selectable by the user to conform to one of two EC/TDS/Salinity conversion factors (0.5 or 0.64), temperature coefficient from 0.0 to 6.0%/°C, temperature reference from 20 to 25°C and a selectable TDS factor of 0.40 to 1.00.

The auto-ranging feature of the EC and TDS modes automatically sets the meter to the scale with the highest possible resolution. The auto-endpoint feature automatically freezes the display once a stable reading is reached.

HI76305 conductivity probe

The HI76305 probe body and integral shaft are housed in a PVC body with a stainless steel, four-ring design. This design offers highly accurate readings over the entire measuring range.

- Four-ring design
  - Immune to coat erection and fouling for longer periods of time

Specifications		HI9813
EC	Range	0.0 to 19.99 mS/cm; 20.0 to 199.9 mS/cm; 200 to 1999 mS/cm; 2.00 to 19.99 S/cm; 20.0 to 80.0 S/cm (80.0 S/cm only with HI76305 probe)
	Resolution	0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; 0.01 S/cm; 0.1 S/cm
	Accuracy	±1% F.S. (±2% F.S. in 20.0 to 80.0 S/cm)
TDS	Range	0.00 to 19.99 g/L; 20.0 to 199.9 g/L; 200 to 1999 g/L; 2.00 to 19.99 kg/L; 20.0 to 80.0 kg/L (80.0 kg/L only with HI76305 probe)
	Resolution	0.01 g/L; 0.1 g/L; 1 g/L; 0.01 kg/L; 0.1 kg/L (default 1 g/L)
	Accuracy	±1% F.S. (default 0.64 factor; 0.40 to 1.00 adjustable)
Salinity	Range	0.0 to 80.0 PSU
	Resolution	0.1 PSU
	Accuracy	±2% of reading
Temperature	Range	-20.0 to 120.0°C (-4.0 to 248.0°F)
	Resolution	0.1°C
	Accuracy	±0.2°C (excluding probe error)
Calibration		Automatic, one point or full calibration (dedicated buffer set: 0.0 mS/cm, 1.000 mS/cm, 80.000 mS/cm)
	Memory	Automatic with HI7310 calibration solution
	Temperature	Automatic with HI7310 calibration solution
	Manual mode	Adjustment at any point within the calibration range
	Calibration Memory	Five calibration points for EC
	Recognized calibration buffers	0.0 mS/cm, 1.000 mS/cm, 12.880 mS/cm, 80.000 mS/cm
	Reference temperature	25°C (77°F)
	TDS Conversion Factor	Selectable from 0.40 to 1.00 (default setting: 0.50)
	Probe	HI76305 4-ring conductivity probe with built-in temperature sensor, 1m cable with HI7010 connector
	Battery Type / Life	4 x 1.5V AA alkaline (or 6V rechargeable) batteries; 200 hours of continuous use without backlight (50 hours with backlight) or auto-off after 5 or 30 (20 hours with backlight) minutes of inactivity
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Construction	ABS, TPR, Stainless Steel, IP67 rated
	Weight	500g (17.64 oz)
Ordering Information		HI9813 is supplied with HI76305 conductivity probe, buffer sets, instructions and rugged carrying case

* Temperature compensation only

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5

Conductivity / TDS

Portable

Portable EC Meters

EC/TDS and Temperature





Direct Soil Activity and Solution Conductivity Measurement Kit

- [illegible]
- [illegible]
  Alert to the user when the battery is low

[illegible]

[illegible]

[illegible]

Why this meter is so important...

[illegible]

[illegible]

[illegible]		
EC	Range	[illegible]
	Resolution	[illegible]
	Accuracy (@25°C / 77°F)	[illegible]
Soil Activity	Range	[illegible]
	Resolution	[illegible]
	Accuracy (@25°C / 77°F)	[illegible]
Additional Specifications	Calibration	[illegible]
	Temperature Compensation	[illegible]
	Probe	[illegible]
	Battery Type / Life	[illegible]
	Environment	[illegible]
	Dimensions	[illegible]
	Weight	[illegible]
Ordering Information	[illegible]	

[illegible]

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5

Conductivity / TDS

portable

Multi-range EC and TDS Meters





Multi-range EC Meters

- [illegible]
- [illegible]
  - [illegible]
- [illegible]
  - [illegible]
- [illegible]

[illegible] conductivity meters [illegible] designed for use in areas of production and quality control.

[illegible] meters are [illegible] products that offer [illegible] in [illegible] typical environmental [illegible]. These rugged probes are made of PVC and are ideal for indoor as well as outdoor measurements.

[illegible] conductivity meters [illegible] can be automatically temperature compensated by using the HI7662 cable [illegible] built-in temperature sensor.

[illegible] of each conductivity in [illegible] is performed by [illegible] adjustments.

[illegible]	[illegible]	[illegible]
Range	[illegible]	[illegible]
Resolution	[illegible]	[illegible]
Accuracy (@20°C/68°F)	[illegible]	[illegible]
Cable Length	[illegible]	[illegible]
Temperature Compensation	[illegible]	[illegible]
Probe	[illegible]	[illegible]
Battery Type / Life	[illegible]	[illegible]
Environment	[illegible]	[illegible]
Dimensions	[illegible]	[illegible]
Weight	[illegible]	[illegible]
Ordering Information	[illegible]	[illegible]

[illegible]

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Conductivity / TDS

EC and Resistivity Meter





TDS Meter

- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

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EC/TDS Meter





EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Guaranteed quality
  - Each label shows the production lot id number, expiration date and calibration temperature correlation table
- Certificate of analysis available
- TDS compliant solutions
  - Choose 0.5 for 500 ppm or 0.7 for 700 ppm NaCl solutions (HI9033)

84 µS/cm Calibration Solution

This 84 µS/cm conductivity solution makes it possible to calibrate instruments at the conductivity value of pure (DI) µS/cm in the measurement of pure or distilled water.

Using our single-dose (5 mL solution sachets) guarantees freshness for every calibration.

1413 µS/cm Calibration Solution

The 1413 µS/cm calibration solutions is best suited for general use. This solution is also available in combined packets with meter pH buffer for easy calibration of multi-parameter instruments.

This solution is also available in different sized bottles and in single-dose, ready to use sachets.

The HI8033 solution is provided in an opaque bottle according to the Drug Administration's regulations, which prevents the reagent from damage due to extended exposure to light.

Our wide range of calibration solutions also includes solutions provided with a certificate of analysis to satisfy the requirements of any application from the farm to the factory.

84 µS/cm Bottles

Code	EC Value @25°C	Size	Package	TDS Bottle	Certificate of Analysis
HI8033	84 µS/cm	500 mL	1 bottle		•
HI70033L	84 µS/cm	25 mL	1 bottle		
HI7033M	84 µS/cm	230 mL	1 bottle		
HI7033L	84 µS/cm	500 mL	1 bottle	•	•

1413 µS/cm Bottles

Code	EC Value @25°C	Size	Package	TDS Bottle	Certificate of Analysis
HI8031	1413 µS/cm	500 mL	1 bottle		•
HI8031/10	1413 µS/cm	10 x 20 mL	1 bottle		
HI7031L	1413 µS/cm	500 mL	1 bottle		
HI7031L/2	1413 µS/cm	2 x 500 mL	1 bottle		•
HI7031M	1413 µS/cm	230 mL	1 bottle		
HI8031L	1413 µS/cm	500 mL	1 bottle	•	•

1413 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70031	1413 µS/cm	20 mL	20 sachets	•
HI70031P	1413 µS/cm	20 mL	20 sachets	
HI7713/25	1413 µS/cm and 12.88 mS/cm	25 mL	25 sachets (12 and 13 mL)	•
HI7713/25P	1413 µS/cm and 12.88 mS/cm	25 mL	25 sachets (12 and 13 mL)	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- [illegible]
  - [illegible]
- [illegible]
- [illegible]
  - [illegible]



5000 µS/cm Calibration Solution

[illegible]

12880 µS/cm Calibration Solution

[illegible]

5000 µS/cm Bottles

Code	EC Value @25°C	Size	Package	Free Bottle	Certificate of Analysis
[illegible]	[illegible]	[illegible]	[illegible]		

5000 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

12880 µS/cm Bottles

Code	EC Value @25°C	Size	Package	Free Bottle	Certificate of Analysis
[illegible]	[illegible]	[illegible]	[illegible]		

12880 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Guaranteed quality
  - Each label shows the production lot id number, expiration date and conductivity/temperature correlation table
- Certificate of analysis available
- FDA compliant bottles
  - Opaque, light-tight bottles that meet FDA standards (HI8033)

80000 µS/cm Calibration Solution

The 80,000 µS/cm calibration solution is needed for meticulous calibration of instruments used to measure high conductivity samples such as saltwater, solutions with incompatible solids and plating baths.

It is available in two different sizes and is also in an FDA approved light-shielded bottle.

This calibration solution is also ideal for use in the agrochemical industry.

111800 µS/cm Calibration Solution

This calibration solution is useful to calibrate instruments used to measure samples with conductivity higher than 100 mS/cm (100,000 µS/cm).

In fact, this solution makes it possible to calibrate instruments that perform under conditions of high salt concentrations.

This calibration solution is ideal for use in systems where phase limits have to be detected (e.g. separation of a substance from saturation), monitoring of brine washing plants, beverage controls, check of acids or bases in ion exchanger processes and some plating baths.

80000 µS/cm Bottles

Code	EC value @ 25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI70446L	80000 µS/cm	500 mL	Carton		
HI70446M	80000 µS/cm	230 mL	Carton		
HI8033L	80000 µS/cm	500 mL	Carton	•	•

111800 µS/cm Bottles

Code	EC value @ 25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI70447L	111800 µS/cm	500 mL	Carton		
HI70447M	111800 µS/cm	230 mL	Carton		
HI8037L	111800 µS/cm	500 mL	Carton	•	•

5

Conductivity / TDS

TDS Calibration Solutions

Quality Solutions for Laboratory Applications

TDS Solutions

Safety Data Sheets

Expiration Date

NIST Traceability





TDS Bottles

Code	TDS Value @25°C	Size	Package	Certificate of Analysis

TDS Sachets

Code	TDS Value @25°C	Size	Package	Certificate of Analysis

Salinity Calibration Solutions

Salinity Bottles

Code	Description	Size	Package



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Dissolved Oxygen Meters

Professional Instruments for a Variety of Applications

Dissolved Oxygen Theory and Measurement

Dissolved oxygen (DO) is a measure of how much oxygen is dissolved in a system. Measurements are usually taken in water using a DO probe and are reported in units that indicate the concentration of gas in a solution is directly proportional to the gas's partial pressure (this can answer the question, "why is a low concentration of oxygen bad for fish?"), and is specific to the gas in the solvent being measured.

The partial pressure of oxygen is in fact a measurement of the thermodynamic activity of its molecules. The rate at which oxygen dissolves in water, and reacts to it, is not determined by its concentration, but by the partial pressure. The Earth's atmosphere is composed of 20.95% oxygen, and all gas mixtures will behave in 100% consistency with this figure.

Percent saturation is the amount of DO present per amount that could be at a given temperature and pressure. Percent saturation is a common way for DO measurement devices to report data, but it is not a true DO measurement because it is based upon the partial pressure of a gas, thus it is unable to define saturation in any solvent.

Concentration measurements of DO can also use the units of parts per million (ppm) or milligrams per liter (mg/L), which means that water DO concentration is given in mg/L. The solvent is always assumed to be water, so other solvents such as oils or acids, (i.e. Henry's Law constant would be different), or those cases, percent saturation should be used and is also known to be ppm or mg/L.

Effects of Temperature and Pressure

As the temperature of a solution increases, the particle movement within that solution increases, and oxygen particles in non-dissolved solutions (gases) are more easily forced out of solution as water warms. Oxygen is also soluble at lower cold water oxygen is more soluble. DO concentration in an unsaturated water's decreases with increasing temperature.

Atmospheric pressure decreases as altitude increases. Since there is lower partial pressure, oxygen is less soluble at higher altitudes. DO concentration in an unsaturated water's decreases with increasing elevations.

Applications

Water quality measurements are vital to environmental monitoring of lakes and rivers. The decay of organic matter can cause low levels of oxygen. The aerobic bacteria consume oxygen, triggering a cycle of decay that can cause a water body "to die," killing aquatic plant and animals.

Aquaculture is the breeding, rearing, and harvesting of plants and animals in all types of water environments. Dissolved oxygen is needed by fish, zooplankton, and plants to survive and reproduce. DO measurement can be used to monitor and control the environment crucial for success.

Wastewater treatment plants rely on bacteria to break down the organic compounds found in water. If the amount of dissolved oxygen in the area needed for the bacteria to do so, aerobic conditions will occur. This amount of DO must be consistently monitored to ensure proper waste treatment.

Wine and beer are both affected by oxygen as various stages during production and storage. DO is an important parameter to monitor for those who wish to produce consistent, high quality products.

Laboratory Monitoring of BOD, OUR and SOUR

BOD (Biochemical Oxygen Demand) is a measurement that indicates the concentration of biodegradable organic matter present in a water sample. It can be used to determine the general quality of water and its degree of pollution. BOD measures the rate of oxygen uptake by microorganisms in a water sample at a fixed temperature over a given period of time. To ensure that all other conditions are equal, a dark growth environment is added to each sample being tested. The samples are kept at 20°C for the 5 or 7 days. The loss of dissolved oxygen during this incubation is called the BOD. BOD is a very important test that determines the relative oxygen requirements of wastewater, effluent, and polluted waters.

OUR (Oxygen Uptake Rate) is used to determine the biological activity of a system in terms of oxygen consumption or respiration rate. It is defined as the milligrams per liter of oxygen consumed per hour. This measurement indicates the rate of metabolic processes in sludge and waste, helping operators determine the stability of waste after digestion.

SOUR (Specific Oxygen Uptake Rate) also determines the oxygen consumption of a system, but is defined as the milligrams of oxygen consumed per gram of volatile suspended solids (VSS) per hour. This quick measurement has many advantages: rapid measure of influent organic load and toxicity, easy to diagnose indication of the presence of toxic or inhibitory wastes, degree of stability, and condition of a sample, and calculation of oxygen demand rates or curves or points in the aeration basin.

Types of Dissolved Oxygen Probes

Hanna's dissolved oxygen meters utilize one of two common types of sensing probes: polarographic sensors and galvanic sensors.

Polarographic DO probes consist of a working electrode (cathode) and counter electrode (anode). A polarizing voltage is applied to these electrodes that is specific for the reduction of oxygen. A thin, gas permeable membrane isolates the sensor elements from the water sample but allows oxygen to pass through. The oxygen that passes through the membrane is reduced at the cathode, causing a current flow which the oxygen concentration is determined.

Galvanic DO probes consist of a working electrode (cathode) and a counter electrode (anode) that act as a battery to produce a voltage specific for the reduction of oxygen. A thin, gas permeable membrane isolates the sensor elements from the water sample but allows oxygen to pass through. The oxygen that passes through the membrane is reduced at the cathode, causing a current flow which the oxygen concentration is determined.

Product Spotlights



edge®DO

Research Grade Dissolved Oxygen and BOD Meter

Comparison Guide

Bench Meters

Portable Meters

6

Dissolved Oxygen

edge® DO



edge®DO–Innovation in a Single Parameter

Additional feature information:

edge®DO technical features









edge®DO design features









A hybrid meter that can be used in portable, wall-mount and bench-top configurations









Digital electrodes



Dissolved oxygen electrode



Specifications		edge® DO
DO	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature compensation	
	Salinity compensation	
	Automatic barometric	
Temperature	Range*	
	Resolution	
	Accuracy	
General Specifications	Probe	
	Logging	
	Memory	
	Interface	
	Power Supply	
	Dimensions	
	Weight	
Ordering Information		

Research Grade Bench Meter

Dissolved Oxygen and BOD



Capacitive Touch

BOD, OUR and SOUR Measurement Modes

Automatic Salinity Compensation

Built-in Barometer

Choice of Calibration

GLP Data

Color Graphic LCD

Data Transfer

Data Logging

Contextual Help



DO probe included

On-screen Features







6

Dissolved Oxygen

Benchtop

Dissolved Oxygen Meter

Dissolved Oxygen and Temperature



- Automatic temperature compensation (ATC)
- Calibration
  - One or two-point calibration with 5 memorized buffers
- GLP Features
  - Meets Good Laboratory Practices
- Connectivity
  - PC (compatible with HI92000 software)
- Data logging
  - Data logging with storage up to 99 readings

Accurate, Repeatable Measurements

The HI9142 is a dissolved oxygen benchtop meter with automatic calibration and four ranges. Users measurement range. The measurement is automatically compensated for altitude and salinity based on the user settings. For example, up to 40.0 in and salinity up to 45 g/L.

Measurements are automatically temperature compensated by using the external probe. All probes with built-in temperature sensor. Five probe features to choose from for easy measurement.

Calibration is performed at one or two points (0.0% using Hanna's HI7040 solution (0.0% is also

Data Logging

With a built-in logging function, measurements are stored in non-volatile memory and can be transferred to a PC through the USB

port using the optional HI92000 software and HI920013 USB cable. The software is provided with an exclusive settings guide of all the commands available and allows data recording, plotting and exporting.

The 99999 record logging interval allows the possibility of process and experiments monitoring (TOC). The logging interval is adjustable by user-selectable intervals from 0 seconds to 180 minutes.

GLP Capabilities

The HI9142 also provides users with GLP (Good Laboratory Practices) capabilities. GLP is a set of functions that allow the storage and retrieval of data regarding calibration. The GLP features provides probe identification and calibration reminder which can be set to alert the user that too much time has elapsed since the last calibration and a new one should be performed.







Standard DO Probe

Thinner DO Probe for Laboratories

Easy, Screw Cap DO Membranes

Carry Extras for Assurance

Specifications		HI76409
	Range	
	Resolution	
	Accuracy	
	Calibration	
	Range	
	Resolution	0.1°F
	Accuracy	
	Probe	
	Logging Interval	
	PC Connection	
	Power Supply	
	Environment	
	Dimensions	
	Weight	
Ordering Information		

6

Dissolved Oxygen

controller

Professional Waterproof Meters

Dissolved Oxygen and BOD



For Universal Applications



Backlit Graphic LCD Display

Waterproof Protection



Quick connect probe



Measurement

BOD ON/Off and TOTAL









Auto-hold

Built-in Barometer



Data Logging



GLP

Intuitive Keypad

Dedicated Help Key

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Setup screen

Use the intuitive setup screen features ... to set up configuration such as ... date, language and units ...

PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI92000 ... and HI92001 software.

Long Battery Life

The display of the meter has a battery icon ... The meter uses four 1.5V AA batteries that ... up to 200 hours of battery life.





Rugged custom carrying case

The HI9811-5 meter, probe, and all accessories are supplied in the HI710300 rugged carrying case designed to provide ... The inside cavity ... for the carrying case ... to securely hold equipment and safety ...

		HI98103
pH	Range	0.00 to 14.00 pH (auto- or manual-ranging)
	Resolution	0.01 pH; 0.001 pH with extended range
	Accuracy @25°C (77°F)	±0.01 pH ±1 digit; ±0.002 pH with extended range
	Calibration	automatic one or two points from 3 USA, NIST or 5 technical buffers; with extended range ...
mV (ORP) / Probe	Range	±1999.9 mV (auto-ranging)
	Resolution	0.1 mV
	Accuracy @25°C (77°F)	±1 mV ±1 digit; ±0.2 mV ±1 digit with extended range
	Calibration	relative zero point (1 point) or ...
Temperature	Range	-5.0 to 60.0°C (23.0 to 140.0°F)
	Resolution	0.1°C / 0.1°F
	Accuracy @25°C (77°F)	±0.15°C ±1 digit (excluding probe error)
	Calibration	...
Dissolved Oxygen / Probe	Measurement Modes	...
	Barometric Compensation	automatic from 500 to 850 mmHg
	Salinity Compensation	automatic from 0 to 70 g/L
	Temperature Compensation	automatic from 0.0 to 50.0°C (32.0 to 122.0°F)
	Probe	...
Hardware, Software & Logging	Logging	...
	PC Connectivity	...
	Battery Type / Life	...
	Auto-off	user selectable 5, 20, 30, 60 min or continuous
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions	...
	Weight	...
Ordering Information		HI98103 ...

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Dissolved Oxygen Meter for Aquaculture

- [illegible]
- [illegible]
- [illegible]



DO Levels at 100% Saturation

Salinity (ppt)

[illegible]	0	10	20	30	40
[illegible]	11.33	10.2	9.13	8.08	8.08
[illegible]	11.3	10.1	9.12	8.06	8.06
[illegible]	9.41	8.48	8.44	7.51	7.51
[illegible]	8.51	8.45	7.61	7.51	6.77
[illegible]	7.56	7.51	7.51	6.66	6.77

Specifications		HI9147
DO	Range	[illegible]
	Resolution	[illegible]
	Accuracy (@ 20°C/68°F)	[illegible]
Temperature	Range	[illegible]
	Resolution	[illegible]
	Accuracy (@ 20°C/68°F)	[illegible]
Additional Specifications	Calibration	[illegible]
	Temperature Calibration Points	[illegible]
	ATC (Auto Compensation)	[illegible]
	Calibration Compensation	[illegible]
	Probe	[illegible]
	Battery Type / Life	[illegible]
	Environment	[illegible]
	Dimensions / Weight	[illegible]
Ordering Information		**HI9147-04** [illegible] **HI9147-10** [illegible] **HI9147-35** [illegible] **HI9147-50** [illegible]

[illegible] www.hannainst.com | HANNA instruments

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Dissolved Oxygen

portable

Dissolved Oxygen Meter



Polarographic Measuring System

Replaceable Membrane Caps

Automatic Calibration

Good Laboratory Practice (GLP)

Automatic Temperature Compensation

Altitude Compensation

Salinity Compensation

Auto End Point

Backlit LCD

Battery Error Prevention System (BEPS)

Specifications		HI9146
pH	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
Temperature	Range	
	Resolution	
	Accuracy (@20°C/68°F)	
Dissolved Oxygen, Temperature, Altitude Compensation, Salinity Compensation, Probe, Battery Type / Life, Environment, Dimensions, Weight	Dissolved Oxygen Calibration	
	Temperature Calibration	
	Altitude Compensation	
	Salinity Compensation	
	Probe	
	Battery Type / Life	
	Environment	
	Dimensions	
	Weight	
Ordering Information		

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Manual Calibration Dissolved Oxygen Meter

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

[illegible]		HI9142
[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]
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	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]



Standard DO Probe

HI76407



Easy, Screw Cap DO Membranes



Electrolyte Solution

DO Probe

with Protective Sleeve



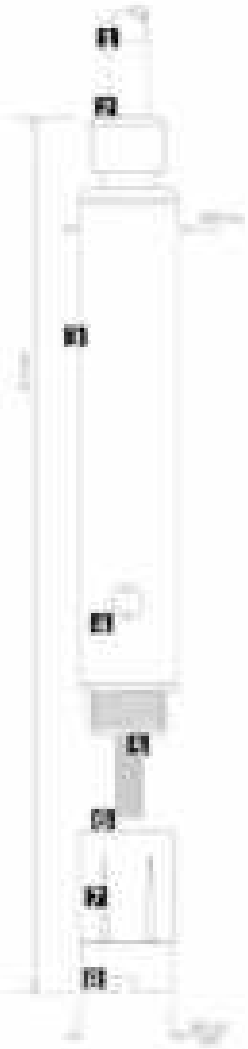


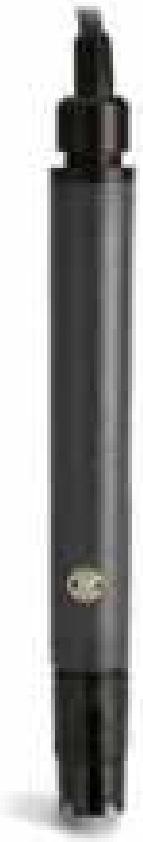


Easy, Screw Cap DO Membranes



DO Solutions





Thinner, Lighter Probe

for Laboratories



Easy, Screw Cap DO Membranes



DO Solutions

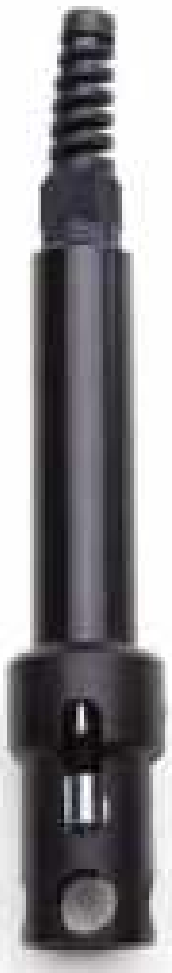
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Dissolved Oxygen

probes and solutions

Galvanic DO Probe

with Protective Cap



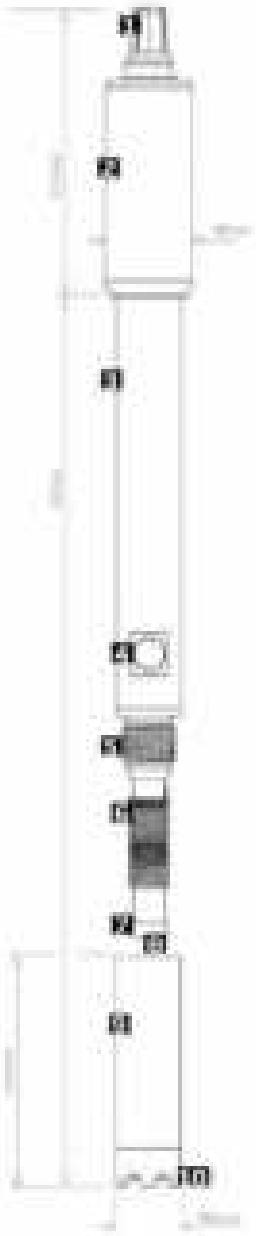




Easy, Screw Cap DO Membranes



DO Solutions





edge® Compatible Digital DO Probe

DO Solutions

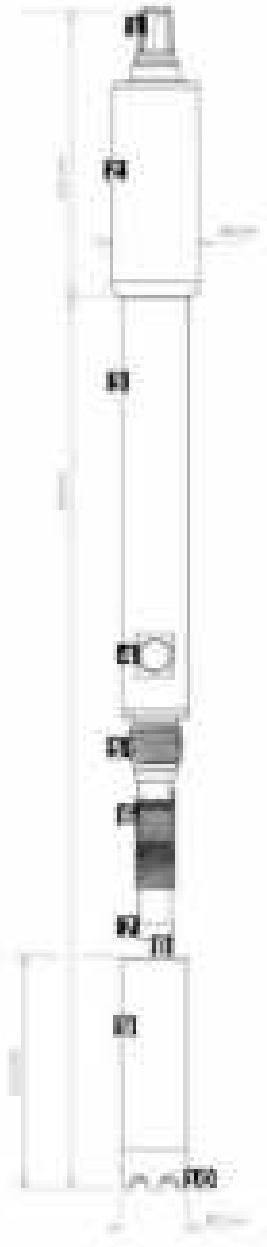
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Dissolved Oxygen

probes and solutions

Polarographic DO Probe







DO Solutions

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Product Spotlights



GPS Multiparameter Meter with Autonomously Logging Probe

Multiparameter Guide

Product Spotlights



Multiparameter Meters

pH / mV, ORP, EC, TDS, Resistivity, Salinity, Seawater α, Dissolved Oxygen, Atmospheric Pressure and Temperature



Research Grade Meters

edge®
pH • EC • DO



The world's most innovative pH, EC and DO meter

edge® technical features













edge® design features











Accepts pH, EC and DO edge® compatible probes

3 | 0 | 0.5 | 8.8 | 8 | 5.5 | 2

A hybrid meter that can be used in portable, wall-mount and bench-top configurations







edge® pH parameter features

- [illegible]
- [illegible]
- [illegible]
- Data logging
  - Manual log on demand
  - Manual log on stability
  - Interval logging
- [illegible]
- [illegible]
- GLP/Alert™ indicators
  - Probe condition
  - Response time
  - Clean buffer
  - Clean electrode
- [illegible]
- Buffers
  - Recognizes, time, offset, slope and buffers used during calibration
- [illegible]
  - Automatic recognition of seven pre-programmed buffers plus two user-defined custom buffers
- [illegible]
  - Identifies buffers used for current calibration
- [illegible]



edge® EC parameter features

- [illegible]
  - Covers all ranges, from 0.00 µS/cm to 500 mS/cm (absolute EC)
- [illegible]
  - ± 2% of the reading (±0.01 µS/cm or 1 digit, whichever is greater)
- [illegible]
  - Offset (1 point) and cell factor calibration
  - Choice of five standards (auto-recognition)
- [illegible]
  - Manual log on demand
  - Manual log on stability
  - Interval logging
- [illegible]
- [illegible]
- [illegible]
  - Automatic
  - No TC (absolute)
- [illegible]
  - Records date, time, offset and cell factor
  - Date of the last performed calibration is stored in the probe (date, time, cell constant, temperature coefficient, reference temperature and battery status of the probe when connected to edge®). GLP data is automatically transferred
- [illegible]
- [illegible]
- [illegible]
  - % NaCl
  - PSU
  - ppt



edge® DO parameter features

- [illegible]
  - Covers all ranges from 0.00 to 40.00 mg/L (ppm) & 0.0 to 300% saturation
- [illegible]
- [illegible]
- Data logging
  - Manual log on demand
  - Manual log on stability
  - Interval logging
- [illegible]
- GLP data
  - Records date, time, calibration standards, probe value and calibration value
- [illegible]
- [illegible]

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Digital electrodes





CAL Check™

pH electrodes























Conductivity probe

Dissolved oxygen electrode



Research Grade Meter

pH/ORP/ISE and EC/TDS/Resistivity/Salinity and Temperature



Customizable User Interface

Color Graphic LCD

Capacitive Touch

Four Ring Conductivity Probe

Choice of Calibration

CAL Check™

GLP Data

pH Measurement with Choice of Concentration Units

pH Measurement with Incremental Pipettes

Data Logging

Data Transfer

Contextual Help

pH and EC Features

pH CAL Check™



EC USP Mode



ISE Features

ISE Incremental Methods



First Step

Sequence of Readings

Results



Additional Features by Screen





Dual Channels



Research Grade Meter

pH/ORP and EC/TDS/Resistivity/Salinity and Temperature



Customizable User Interface

The user interface of the HI5521 allows the user to show measurements in various modes: basic measurement with or without GLP information, real time graphing and logging runs. Calibration reminders can be adjusted from four months and an on-time. Programmable alarm limits can be set to monitor each site's allowable limits.

Color Graphic LCD

The HI5521 features a color graphic LCD with an screen help, graphics, and custom icon configurations. The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.

Capacitive Touch

The HI5521 features a brand-new capacitive touch buttons for accurate keystrokes when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching measurement modes and four virtual keys that change based upon use. The capacitive touch technology ensures that buttons are never germ triggered with sweeping motions.

Four Ring Conductivity Probe

All readings are performed with the HI76312 four ring conductivity probe that has a built-in temperature sensor for automatic temperature correction. The housing and body of the electrode is made of Polyetherimide (PEI) plastic that is resistant to many harsh chemicals. The four ring design allows for this probe to be used over a wide range of measurements.

Choice of Calibration

Automatic buffer recognition, manual/automatic, and short calibration options are available for calibrating up to five points. From a selection of eight standard buffers and up to five custom buffers. For those who prefer to customize their own standard buffers or use existing along with a choice of single or multi-point. Calibration can be set up to four points when multi-point calibration.

CAL Check™

CAL Check™ assistance to potential problems during the calibration of the pH and ISE. Informative tools "Electrode Slow", "Buffer Contaminated", and "Wrong Buffer" identify the problem.

GLP Data

HI5521 includes a GLP feature that allows users to view calibration data and calibration history information at the touch of a key. Calibration data include date, time, standards used for calibration.

Data Logging

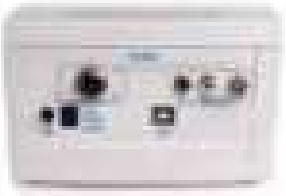
These meter takes logging modes are available on the HI5521: on-demand, manual and automated logging. Automatic and manual logs up to 100 sets with 50,000 records recorded, with up to 200,000 total data points. Automatic logging features the option for overlap recording to ensure no gaps and time out.

Data Transfer

Data can be transferred to a PC with USB cable and HI 92000 software (both sold separately).

Contextual Help

Context sensitive help is always available through a dedicated "HELP" key. Short tutorial messages and short tips are available on screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.



Dual Channels

The key measurements (sample) of the HI5521 are automatically displayed for ease of use and readability.

Conductivity shown in a duplex read mode.

pH and EC Features

pH CAL Check™

- Each time a pH calibration is performed, the instrument compares the new calibration with the previous one. When the comparison indicates a significant difference, the message alerts the user to either clear the electrode, check the buffer or both
- When measurement is performed for 7 hrs after calibration is due, the instrument will alert the user with a message on the LCD
- The condition of the pH electrode or last calibration is shown on the display, as well as the date and time
- To avoid making readings with old calibrations, the instrument automatically reverts to the pH reading mode when the calibration has expired



EC USP Mode





Multiparameter Meter

pH/ORP/ISE and EC/TDS/Salinity



- Free quick calibration
  - Up to five point pH calibration
- Hold feature
  - Hold button freezes readings on the display
- ATC
  - Automatic temperature compensation for pH and EC
- Comm Ports
  - PC (HI92300) via USB
- Multiparameter channels
  - Two input channels (pH/ORP/ISE and EC/TDS/Resistivity/Salinity)

Dual-Channel, with Up to Seven Parameters

HI5522 is a dual-channel instrument that measures various parameters with this single advanced bench meter so you can measure pH, ORP or ISE, conductivity (EC), TDS or salinity and temperature.

Using an external temperature probe, pH readings are automatically compensated for temperature. To ensure a higher level of precision, pH can be calibrated using up to five calibration points, chosen from the seven available memorized buffers.

The instrument can take measurements using ORP sensors (pin, pin-shaped rod). Due to its capability to measure mV with a resolution of 0.1 mV, as well as ISE and factor (or the end user) can choose

EC measurements can be compensated relative to a selected reference temperature. The EC calibration mode allows you to choose from among six recognized conductivity standards and

perform a single point calibration. The most suitable EC and TDS range for your application is automatically selected. The HI5522 also includes the ability to set and lock the range manually.

Good Laboratory Practice

This instrument meets GLP specifications that allow for the storage and retrieval of calibration data for pH, ORP, ISE and salinity calibration and sample measurement as well as data regarding the maintenance and status of the electrode.

Data Logging

With a built-in logging function, readings and time/date are stored in non-volatile memory and can be transferred to a PC through the USB port. Users can manually log up to 200 records and in interval log up to 5000 records.

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Multiparameter

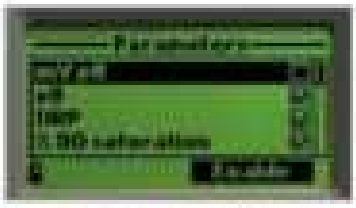
portable

GPS Multiparameter Meters

pH/ORP/ISE, EC/TDS/ Resistivity/Salinity/Seawater & Turbidity, DO, Temperature and Atmospheric Pressure



Waterproof Protection



Backlit Dot Matrix LCD Display

Intuitive Keypad



Auto-sensor Recognition

Automatic Temperature Compensation

Automatic Barometric Pressure Compensation



Quick Calibration

Dedicated Help Key

GLP Data

Data Logging



Graphing Capability

PC Connectivity

Long Battery Life



Rugged Custom Carrying Case











With two probes to choose from, these digital probes provide stable, noise-free sensor signal management without the need for pre-amplified pH sensors.

Sensor Configurations



Dissolved Oxygen

pH

ISE







or

Conductivity

Conductivity and Turbidity







FastTracker®

Fast Tracker®-Tag Identification System

iButton® Tags are Easy to Install

Measuring and Tracking

GPS (Global Positioning System)

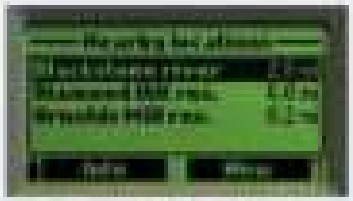
Features



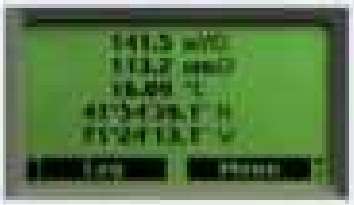
GPS Screen Features





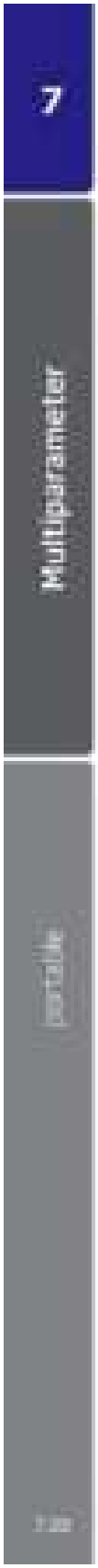











7
Multiparameter
Portable

Ordering Information

HI9829 – [ ][ ][ ][ ][ ]



All HI9829 Kits Include:

Optional Kit Components:

Kit Specific Components:

Spare Solution

7

Multiparameter

Portable

Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Probe with Rugged Carrying Case



Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Logging Probe with Rugged Carrying Case



7

Multiparameter

portable

Solutions & Accessories Ordering Information



Probe Only, No Sensors

Sensors with O-Ring

Quick Calibration Solutions

pH Calibration Solutions

ORP Calibration Solutions

EC Calibration Solutions

Dissolved Oxygen Solutions

Solutions & Accessories Ordering Information

Turbidity Calibration Solutions

ISE Standards

Probe Maintenance Kit

pH/ORP Cleaning and Storage Solutions

Accessories









7

Multiparameter

portable

Multiparameter Waterproof Meter

pH, ORP, EC, TDS, Resistivity, Salinity, Seawater ρ, Dissolved Oxygen, Atmospheric Pressure and Temperature



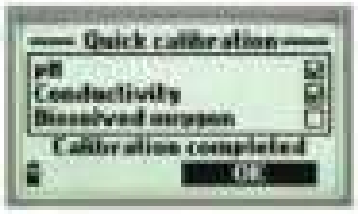
Backlit Graphic LCD Display

Waterproof Protection



Quick Connect Digital Probe

Color Coded, Field Replaceable Sensors



Standard or Quick Calibration

Auto-sensor Recognition

Automatic Temperature Compensation

Automatic Barometric Pressure Compensation



GLP Data



Data Logging

Intuitive Keypad



Dedicated Help Key

PC Connectivity

Long Battery Life



Rugged Custom Carrying Case

Probe and Sensors



Multi-function Sensor







7

Multiparameter

portable

Multiparameter Waterproof Meter

pH, ORP, EC, TDS, Resistivity, Salinity, Seawater α and Temperature



Backlit Graphic LCD Display

Waterproof Protection



Quick Connect Digital Probe

Color Coded, Field Replaceable Sensors



Standard or Quick Calibration

Auto-sensor Recognition

Automatic Temperature Compensation



GLP Data



Data Logging



Intuitive Keypad



Dedicated Help Key

PC Connectivity

Long Battery Life



Rugged Custom Carrying Case

Water and Sensors



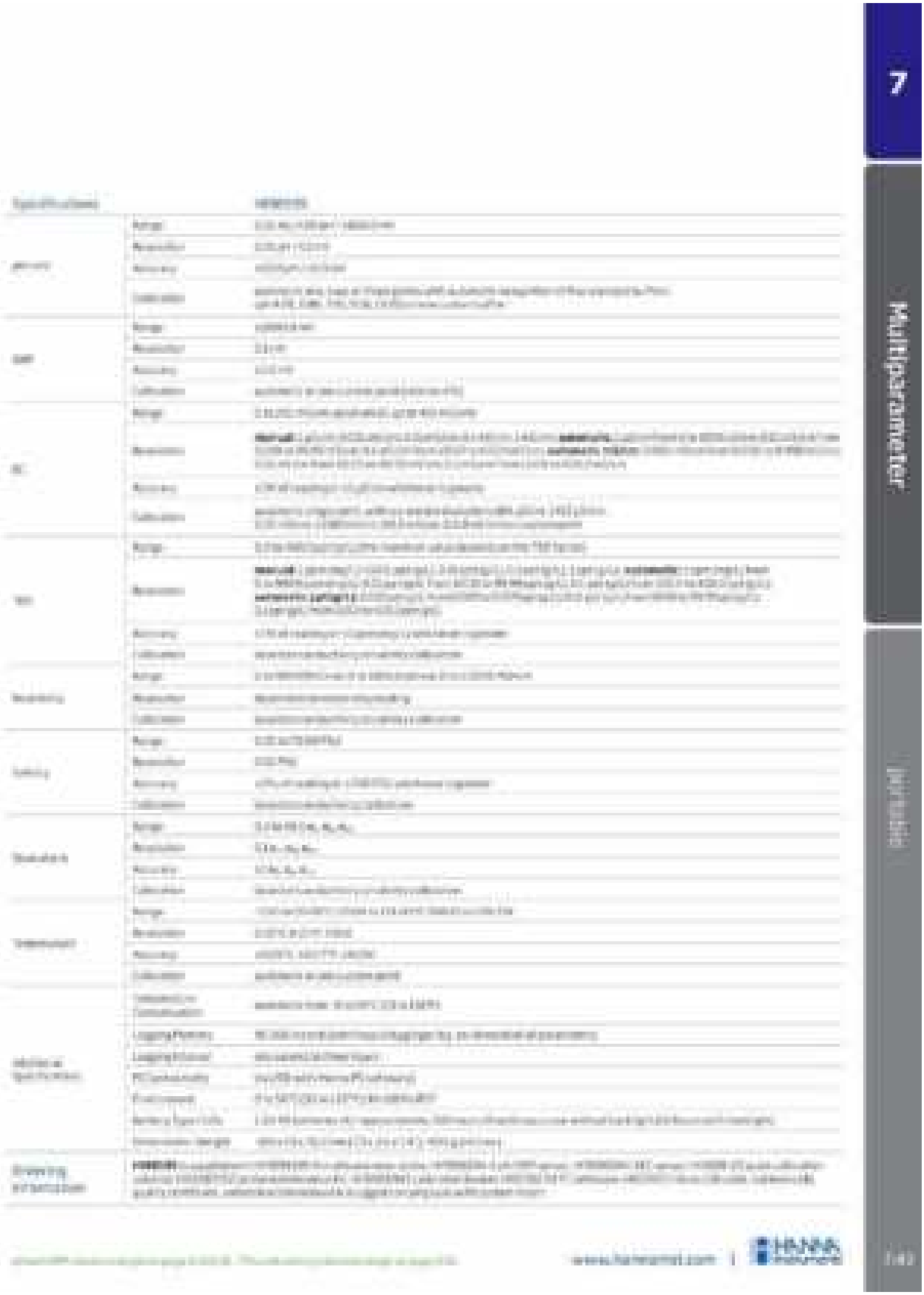
Multi Function Sensor











7

Multiparameter

portable

Multiparameter Waterproof Meter

pH, ORP, Dissolved Oxygen, Atmospheric Pressure and Temperature

pH Features

- Calibration
  - Up to a three-point calibration with five standard buffers and one custom buffer available
- Information
  - Useful for diagnostics
- GLP data
  - Offset, slope, date, time and buffer recall
- Automatically temperature compensated readings
- pH or ORP combination electrode sensing
  - Certified and maintenance free
  - Double junction for reduced contamination of reference cell

Dissolved Oxygen Features

- Choice of units
  - Display errors in saturation or ppm (mg/L)
- Salinity compensation for saline waters
  - Manual entry of salinity values
  - Readings compensated for salinity effects
- Built-in barometer
  - Accurate, compensation for changes in atmospheric pressure
  - User-selectable units
- Temperature compensation
- Diagnostics
  - Automatic calibration at power on
- Probe check
  - Ready for use HI 76410 pH/ORP combination electrode with easy connector

The HI 98195 is a waterproof portable logging multiparameter meter that measures up to 5 different water quality parameters. It's multi-sensor probe allows for the measurement of key parameters including pH, ORP, combination dissolved oxygen, and temperature. The probe transmits readings digitally to the meter where data points can be displayed and logged. The complete system is simple to set up and easy to use.



Backlit Graphic LCD Display

The HI98196 features a backlit graphic LCD with on-screen help and the capability to display up to five parameters simultaneously. The graphic display allows for the use of on-key keys to provide for an intuitive user interface.

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand accidental immersion in water at a depth of 1 m for up to 30 minutes. The probe has an IP68 rating for continuous immersion in water.



Quick Connect Digital Probe

The HI 7698196 probe features a Quick Connect DIN connector that makes a waterproof connection with the meter.

Color Coded, Field Replaceable Sensors

To help replacement is quick and easy, with field replaceable sensors, the connectors that are color coded for easy sensor pairing identification.

Standard Calibration

Standard calibration routines are available for calibrating up to three points from a selection of five standard pH buffers and one custom buffer. Dissolved oxygen calibration is up to two standard points or a single custom point.

Auto-sensor Recognition

The probe and meter automatically recognize the sensors that are connected. Any parameters not used by the probe will not have the parameter displayed in the configuration.

Automatic Temperature Compensation

Every sensor has a temperature sensor, allows for automatic temperature compensation of pH and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

The meter has a built-in barometric pressure sensor for automatic compensation.



GLP Data

HI98196 records a GLP report that allows users to view calibration data and calibration expiration info. Access at the touch of a key. Calibration data is date, time, buffers standards used for calibration and operator identification.



Data Logging

The HI98196 allows users to store up to 40,000 readings to log on-demand samples with logging intervals from one second to three hours.

Intuitive Keypad

The HI98196 keypad has dedicated keys for power, backlight, calibration, enter, help and alphanumeric characters. The meter also features two arrow keys that navigate the user through the configuration of each parameter, meter setup and logging of data. The interface is intuitive for any user's level of experience.



Setup

Extensive setup screen features.



Dedicated Help Key

Context help is always available through a dedicated "HELP" key. Detailed error messages and directions are available on screen to quickly and easily guide users through calibration. The help information displayed is relative to the current operation being viewed.

PC Connectivity

Logged data can be transferred to a Windows® compatible PC and the included HI 92000 Windows® software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 800 hours of battery life.



Rugged custom carrying case

The HI 98196 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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Probe and Sensors



Multi-Function Sensor

- Quick sensor replacement

Sensor replacement is quick and easy with fast-replaceable, screw type connectors (and are color coded for easy identification). These sensors automatically recognize sensors









7

Multiparameter

portable

pH/EC/TDS/ Temperature Meters



HI1288 amphoteric pH electrode

-
-
-
-





-

7

Multiparameter

portable

GroPro™ pH / EC / TDS / Temperature Meter

with Multiparameter Probe



Measure nutrient solutions with one probe

pH and EC/TDS are two of the most common parameters measured in hydroponic nutrient solutions. With the HI9814, there's no need to switch between meters or exchange probes. The HI9814 uses a single specialized probe design to conveniently measure both key parameters at the same time.

Other user-selectable features include selectable TDS factors of 0.5 and 0.7 as well as a unit of Siemens (S) to meet your specific application.

Calibrating pH and EC with one solution

The HI9814 offers a quick calibration function that allows the calibration of both parameters with a single solution. Simply enter calibration mode and the meter will automatically detect and calibrate pH and EC sensors. EC calibration is automatically applied for TDS readings.

HI1285-7 Multiparameter Probe

- Seamless in a single probe
- Can measure pH and EC/TDS in a single sample
- Simultaneous readings
- Polypropylene body

The polypropylene body houses all the sensors in a single body design and is durable. The probe is perfect for maintenance free operation. It does not have to be refilled periodically.

The specially engineered EC/TDS and pH/ORP sensors are also a unique feature of this probe. A fiber guard on each sensor protects against mechanical damage and ensures consistent readings. These features make this probe ideal for use in hydroponic solutions.

A solid state pressure sensor has been employed into the probe to protect the pH measurement from sudden changes in pressure. Sources of electrical noise include ballasts used in lighting and pumps in circulating water and nutrient solutions.



Significance of One

Hydroponics is a method of growing plants in the absence of soil, by using mineral nutrient solutions in water. Plants receive all their mineral nutrients through the use of a nutrient solution. Hydroponic solutions must be carefully monitored for both pH and EC as the amount of nutrients conveyed to the plant will dictate its chemistry and longevity.

EC readings can be expressed TDS in terms of Hydroponics. TDS specifies the salt contained in the reading. If a nutrient solution's base TDS is not defined, meaning, the conversion factor cannot be based on the type of solute being measured. Utilizing the conversion factors of 0.5 and 0.7 allows hydroponics growers to have a reliable measure from various nutrient solutions.

Specifications		HI9814
pH	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
EC	Range	
	Resolution	
	Accuracy	
	Calibration	
	Temperature Compensation	
TDS	Range	
	Resolution	
	Accuracy	
	Conversion Factor	
Temperature	Range	
	Resolution	
	Accuracy	
General Specifications	Type of GPC Operation	
	Probe Included	
	Battery Type/Life	
	Auto-OFF	
	Environment	
	Dimensions / Weight	
Ordering Information		



- Dual optimized HI1285-7 probe measures pH and EC/TDS in hydroponic nutrient solutions

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pH/EC/TDS/ Temperature Portable Meter





HI9811-5 CAL Check™ Feature



HI1285 series probes

- Amplified probes (-A)
  - The sensor is made circuit has a built-in amplifier that will reduce the effects of electrical noise on the high impedance (HI model) measurement. Examples of sources of electrical noise include electric motors, ballasts, and pumps which are common in grow houses.
- Dissolved oxygen (DO) sensor
  - The DO readings are performed by an oxygen-permeable sensor. An alternating voltage is applied to the sensor and the amount of current that passes between the two electrodes changes in dependence upon the amount of oxygen that diffuses across. A galvanic amount of salt present in solution or electrolyte is needed.
- Polarographic body
  - The polarographic body mounts at the sensor's end. The body is tough and it durable. The probes are filled for maintenance free operation. It does not have to be refilled periodically.
- Exposed junction probes
- Gel filled, maintenance free polarographic body

Specifications		HI98121-5	HI98121-6
pH	Range	0.0 to 14.0 pH	-2.0 to 16.0 pH
	Resolution	0.1 pH	0.1 pH
	Accuracy	±0.1 pH	±0.1 pH
EC	Range	0.00 to 9.99 mS/cm	0.00 to 9.99 mS/cm
	Resolution	0.01 mS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 9999 ppm (mg/L)	0 to 9999 ppm (mg/L)
	Resolution	1 ppm (mg/L)	1 ppm (mg/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C	0.0 to 60.0°C
	Resolution	0.1°C	0.1°C
	Accuracy	±0.5°C	±0.5°C
Additional Specifications	TDS conversion factor	0.5 (default), 0.7 (442 conversion factor), 0.64 (NaCl conversion factor)	0.5 (default), 0.7 (442 conversion factor), 0.64 (NaCl conversion factor)
	pH/EC/TDS calibration	manual, automatic with up to five calibration points (recognizes HI7004 and HI7007 calibration solutions)	manual, automatic with up to five calibration points (recognizes HI7004 and HI7007 calibration solutions)
	Temperature calibration	automatic or manual with one point calibration (0.0 to 60.0°C / 32.0 to 140.0°F)	automatic or manual with one point calibration (0.0 to 60.0°C / 32.0 to 140.0°F)
	Probe	HI1285 polarographic body, pin, amplified, exchangeable, probe with 4 pin connector and 1 m (3.3 ft) cable (HI1285-5)	HI1285-6 polarographic body, pin, amplified, exchangeable, probe with 4 pin connector and 1 m (3.3 ft) cable (HI1285-6)
	Battery type (qty)	9V, alkaline battery (HI710015) or rechargeable battery (HI710016)	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Dimensions	146 x 81 x 36 mm (5.7 x 3.2 x 1.4")	
	Weight	290 g (10.2 oz)	
Ordering Information	HI98121-5 Rugged pH/EC/TDS/°C waterproof tester with 1.5 m (5') cable and probe, calibration solutions and electrode conditioning solution sachet, HI76321-442 (5 ml) calibration solution sachet, HI76321-1413 (5 ml) calibration solution sachet, HI76321-12880 (5 ml) calibration solution sachet, HI76321-12 (5 ml) electrode conditioning solution sachet, HI76321-300 (5 ml) cleaning solution sachet, HI76321-25 (5 ml) storage solution sachet, instructions and rugged carrying case		
	HI98121-6 Rugged pH/EC/TDS/°C waterproof tester with 1.5 m (5') cable and probe, calibration solutions and electrode conditioning solution sachet, HI76321-442 (5 ml) calibration solution sachet, HI76321-1413 (5 ml) calibration solution sachet, HI76321-12880 (5 ml) calibration solution sachet, HI76321-12 (5 ml) electrode conditioning solution sachet, HI76321-300 (5 ml) cleaning solution sachet, HI76321-25 (5 ml) storage solution sachet, instructions and rugged carrying case		

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Multiparameter

portable

pH/EC/TDS/ Temperature Portable Meters





HI1285-5 probe

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Specifications		HI98130-5	HI98131-5
pH	Range	[redacted]	[redacted]
	Resolution	[redacted]	[redacted]
	Accuracy	[redacted]	[redacted]
EC	Range	[redacted]	[redacted]
	Resolution	[redacted]	[redacted]
	Accuracy	[redacted]	[redacted]
TDS	Range	[redacted]	[redacted]
	Resolution	[redacted]	[redacted]
	Accuracy	[redacted]	[redacted]
Temperature	Range	[redacted]	[redacted]
	Resolution	[redacted]	[redacted]
	Accuracy	[redacted]	[redacted]
additional specifications	[redacted]	[redacted]	
	Calibration	[redacted]	
	Temperature compensation	[redacted]	
	Probe included	[redacted]	
	Battery Type / Life	[redacted]	
	Environment	[redacted]	
	Dimensions	[redacted]	
	Weight	[redacted]	
Ordering information	[redacted]		

[redacted]

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7

Multiparameter

Replacement Probes



Code	HI1297-7	HI1297-8	HI1297-5	HI1298
Description	glass body/Black UV anti-UV probe	glass body/Black UV anti-UV probe	glass body/Black UV anti-UV probe	glass body/Black UV anti-UV probe
Reference	single junction Ag/AgCl	single junction Ag/AgCl	single junction Ag/AgCl	single junction Ag/AgCl
Junction / Flow Rate	ceramic	ceramic	ceramic	ceramic
Electrolyte	gel	gel	gel	gel
Max Pressure	0.5 bar	0.5 bar	0.5 bar	1 bar
Range	pH 0 to 14 (0 to 70°C) 0 to 14 pH (32 to 158°F)	pH 0 to 14 (0 to 70°C) 0 to 14 pH (32 to 158°F)	pH 0 to 14 (0 to 70°C) 0 to 14 pH (32 to 158°F)	pH 0 to 14 (0 to 70°C) 0 to 14 pH (32 to 158°F)
Tip Shape	spherical, glass (0.6 mm dia)	spherical, glass (0.6 mm dia)	spherical, glass (0.6 mm dia)	spherical, glass (0.6 mm dia)
Temperature Sensor	yes	yes	yes	yes
Amplifier	yes	yes	yes	yes
Body Material	glass epoxy resin	glass epoxy resin	glass epoxy resin	glass epoxy resin
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3') with 4 m (13')
Recommended use	general purpose, hydroponics	general purpose, food applications, environmental applications, water treatment, boiler, cooling towers	general purpose, food applications, environmental applications, water treatment, boiler, cooling towers	general purpose, food applications, environmental applications, water treatment, boiler, cooling towers
Plug	DIN with 3.5 mm Check®	DIN with 3.5 mm Check®	DIN	DIN

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Stirrers 8.3
Compact, Round Edge
with digital tachometer 8.4
Compact, Round Edge 8.6

Magnetic Stirrers



Speedsafe™ from Hanna

There are two types of magnetic stirrers, mechanical and electronic. Most manufacturers of magnetic stirrers use the mechanical approach using cast aluminum for the structural material and sintered neodymium-iron-boron for the magnet. These units are not only very heavy but also very inaccurate. The use of these materials and methods appear to make the units rugged and strong, but they are instead cumbersome and obsolete.

Something as simple as completely decoupling the drive mechanism, or motor, from the stirring rod can be achieved with simple mechanical processes. The only choice that the user has with electromechanical units is to increase the stirring bar via the temperature. With Hanna stirrers, you can do more. The Hanna approach is electronic.

Speed sensor and motor: Each Hanna stirrer is equipped with a speed sensing device (Hall sensor) coupled with an RPC (frequency to voltage converter), which measures the speed. As the speed reaches a preset maximum limit, the speed feedback slows down the RPM voltage until it levels off to slow down the motor speed. This ensures that when the load is suddenly removed from the stirrer, the motor will not accelerate to such a high speed that it will be hazardous to both the user and the stirrer, a feature not commonly found in conventional stirrers.

Sophisticated Engineering

Precise engineered manufactured to strict specifications to ensure absolute reliability. All components are moulded into a molded casing covered with either ABS plastic or a stainless steel plate, which are splash proof and chemically resistant. Precise vibration and a well-balanced rotating arm provide years of trouble-free operation.



Our Most Popular Magnetic Mini-Stirrers

- Compact size
  - The compact size of these stirrers allows users to maximize bench space for efficiency and safety
- Safety
  - Speedsafe™ limits the maximum speed to 1000 rpm even if a load is suddenly removed
- Durability
  - The ABS housing of HI300M and HI300N Classic resists harmful chemicals from the lab

The HI300M, HI300N Classic and HI300N are compact and lightweight, so they are of laboratory bench space is no longer a concern.

These stirrers incorporate electronic controls that allow the user to regulate the speed with greater precision. When in the lab, a sample is removed for the stirrer before reducing the speed. This would cause the motor of conventional equipment to accelerate until it destroyed. This does not pose a problem with the HI300 series as the Speedsafe™ mechanism ensures that the loadmeter speed is never exceeded.

HI300M and HI300N Classic supplied with an ATC probe that will avoid the harmful effects of thermal shocks are accidentally ejected.

HI300M has an ABS stainless steel rivets. This model is ideal for applications that involve exposure to vapors.

Specifications	HI300M	HI300N Classic	HI300N
Maximum Stirring Capacity	1 liter (0.26 gallons)	1 liter (0.26 gallons)	1 liter (0.26 gallons)
Min. Speed Range	100 rpm	100 rpm	100 rpm
Max. Speed Range	1000 rpm	1000 rpm	1000 rpm
Power Supply	220 VAC ±10% at 50/60 Hz, 50 VA	12 VDC	220 VAC ±10% at 50/60 Hz, 50 VA
Installation Category	II	II	II
Case Material	ABS plastic	ABS plastic	ABS plastic with stainless steel rivets
Environment	0 to 50°C (32 to 122°F) RH max 95%	0 to 50°C (32 to 122°F) RH max 95%	0 to 50°C (32 to 122°F) RH max 95%
Dimensions	120 x 120 x 85 mm (4.8 x 4.8 x 3.4")	120 x 120 x 85 mm (4.8 x 4.8 x 3.4")	120 x 120 x 85 mm (4.8 x 4.8 x 3.4")
Weight	0.48 kg (1.1 lbs)	0.51 kg (1.1 lbs)	0.78 kg (1.7 lbs)
Ordering Information	HI300M 1 liter (0.26 gallons) magnetic mini-stirrer with Speedsafe™ and ABS housing. HI300N 2 liter (0.53 gallons) magnetic mini-stirrer with Speedsafe™ and ABS housing. HI300N Classic 1 liter (0.26 gallons) magnetic mini-stirrer with Speedsafe™ and ABS housing. Supplied with magnetic bar and temperature probe.		
Accessories	HI731318 Magnetic stirring bar (10)		

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HI38

Compact Magnetic Mini-Stirrers

with Electrode Holder

- Electrode holder
  - The HI38 series features an electrode holder that fits any standard electrode
- Round edge
- Compact design
  - Easy to handle, more lightweight and compact (only 1 kg/2.2 lb) than and can quickly be upgraded to fully functional
- Rugged body
  - Chemical resistant housing resists damage by accidental spills

Common stirrers are manufactured with steel and aluminum components. These units are often too large and heavy to fit in the restricted space of measurements. Hanna HI38 series is compact, lightweight and inexpensive.

Often, in the lab, a sample is removed from a stirrer before reducing the speed. Naturally, this would cause the sample to accelerate, and it is called splash. Hanna stirrers incorporate electronic controls that allow the user to regulate the speed with greater precision. In addition to speed control, the Speedsafe™ feature helps ensure that the maximum speed is never exceeded. HI38 mini-stirrers are available in different colors. The various colors can allow easy sample identification in a laboratory.



11 colors to choose from





Compact Magnetic Mini-Stirrers

11 colors to choose from



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Hanna Chemical Test Kits

Singlepoint Colorimetric Kits

Hanna test kits are a convenient way to perform an accurate chemical analysis. The wide variety of single parameter test kits guarantees to find the ideal solution for your checker disc, titrator and multiparameter needs.

Quick and easy to use, Hanna colorimetric chemical test kits are the ideal solution for water analysis of many chemical parameters. The kits are supplied with a test equipment container which only the color scale style sheet to the sample being tested. To measure the color comparison process, no test additional. The reagents are either liquid powder, depending on the parameter to be measured.

Hanna Checker® Disc test kits use the technology of Lovibond's kits to provide greater accuracy and resolution. The Checker® Disc is a rotary comparator wheel in which there is light or graduation to find concentration of the chemical you are testing for. The user just needs to add both the blank and the reacted samples inside the Checker® Disc. By turning the wheel, the user can then visually find the color and obtain the reading. This technique enhances resolution and accuracy.

Titration test kits are easy to use with a very high resolution and accuracy. To determine the concentration of the chemical parameter, titration is a titration technique which consists of reacting the number of drops of titrant required to cause a color change in the sample. Dropper bottles make titration extremely quick and easy without compromising accuracy. The endpoint can be determined with enhanced accuracy and simplicity.

Hanna test kits are supplied ready to use, complete with all the necessary accessories. They are designed to help you to work faster, faster and safer. All Hanna chemical test kits use color-coded dropper bottles which are easy to recognize during analysis.

With every kits, a plastic basket is provided for the easy organization to prevent spills and waste.

Every kit is manufactured according to the highest quality standards and a Safety Data Sheet (SDS) is available for each product, online.

Designed for Specific Applications

Hanna colorimetric chemical test kits are tailor-made for specific applications.

Includes all you need

Hanna test kits include all the necessary reagents and accessories for their specific applications.

Ideal for field measurements

Multiparameter test kits from Hanna are supplied with a hard carrying case for easy storage and transport. Organized and easy to carry around in the field. Our carrying cases are rugged, built to last, and easily refilled with replacement reagents as needed.

Comprehensive Instructions

Every chemical test kit is supplied with a comprehensive, easy to understand instruction manual. The manuals guide you through the analysis step by step, making it very convenient to check your test from time to time.

One more advantage: Hanna's exclusive pHep® for pH measurements

For those who must offer pH measurements, Hanna has included the exclusive pHep® electrode, tester so that your pH analysis will always be quick and reliable. Each pHep® ranges have been tested accurately and stored over the entire pH range. Due to the pHep®'s long life, high accuracy and extended range, these problems are avoided.

Product Spotlights



Environmental Monitoring Test Kit

Ideal for Professionals and Students



Hanna Soil Test Kit



Backpack Lab® Marine Science Educational Test Kit

Single Parameter Test Kits

Parameter	Method	Range	# of Tests	Code	Page
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Single Parameter Test Kits

Parameter	Method	Range	# of Tests	Code	Page
Oxygen, Dissolved	Winkler	0.0 to 20.0 mg/L (ppm)	100 tests	HI3810	9.16
Alkalinity	Alkalinity Titration	0.0 to 3.0 meq/L (ppm)	100	HI3811	9.17
Phosphate	Phosphate (PO4)	0 to 50 mg/L (ppm)	50	HI3833	9.17
	Phosphate (PO4)	0.00 to 1.30 mg/L (ppm) 0.0 to 13.0 mg/L (ppm) 0 to 130 mg/L (ppm)	100	HI3834	9.18
Salinity	Salinity	Mohr titration	100 tests	HI3815	9.19
Silica (HR)	Silica (SiO2)	Heteropoly blue	100	HI3837	9.19
Nitrate	Nitrate (NO3)	0 to 30 mg/L (ppm)	100	HI3874	9.20
	Nitrate (NO3)	0.0 to 30.0 mg/L (ppm) 0.00 to 30.00 mg/L (ppm)	100	HI3873	9.20
Sulfide	Sulfide (as H_2S)	Methylene blue	100 tests	HI3827	9.21

Multiparameter Test Kits

	Parameter	Method	Range	# of Tests	Page
HI3895 Agriculture Test Kit, Basic	Nitrogen	colorimetric		25	9.5
	Phosphorus	colorimetric		25	
	pH	colorimetric		25	
	Potassium	colorimetric		25	
HI3896 Agriculture Test Kit, Professional	Nitrogen	colorimetric		25	9.5
	Phosphorus	colorimetric		25	
	pH	colorimetric		25	
	Potassium	colorimetric		25	
HI3827 Boiler and Feedwater Test Kit	Alkalinity-M (CaCO3)	titration		100 mg	9.6
	Chloride (Cl-)	titration		100 mg	
	Hardness (Ca+Mg)	titration		100 mg	
	Phosphate	colorimetric		50	
	pH	electrochemical sensor		No pH Increments	
	Sulfite (as SO_3^{2-})	titration		100 mg	
HI3821 Cooling and Boiler Condensate Test Kit	Alkalinity-M (CaCO3)	titration		100 mg	9.6
	Chloride (Cl-)	titration		100 mg	
	Hardness (Ca+Mg)	titration		100 mg	
	Phosphate	colorimetric		50 mg	
	Copper (Cu)	titration		100 mg	
	Sulfite (as SO_3^{2-})	titration		100 mg	
HI3818 Environmental Monitoring Test Kit	Alkalinity-M (CaCO3)	titration		100 mg	9.6
	Chloride (Cl-)	titration		100 mg	
	Carbon Dioxide	titration		100 mg	
	Hardness (Ca+Mg)	titration		100 mg	
	Nitrate (as NO_3^-)	titration		100 mg	
	pH	electrochemical sensor		No pH Increments	
HI3822 Marine Test Kit	Alkalinity-M (CaCO3)	titration		100 mg	9.6
	Carbon Dioxide	titration		100 mg	
	Hardness (Ca+Mg)	titration		100 mg	
	Nitrate (as NO_3^-)	titration		100 mg	
	pH	electrochemical sensor		No pH Increments	
	Salinity	titration		100 mg	
HI3897 QUICKcheck Swimming Pool Test Kit	Free Chlorine	colorimetric		50 mg	9.6
	pH	colorimetric		100 mg	
HI3817 Water Quality Test Kit	Alkalinity-M (CaCO3)	titration		100 mg	9.7
	Chloride (Cl-)	titration		100 mg	
	Hardness (Ca+Mg)	titration		100 mg	
	Iron	colorimetric		50	
	pH	electrochemical sensor		No pH Increments	
	Sulfite (as SO_3^{2-})	titration		100 mg	



Backpack Lab® Multiparameter Test Kits

	Parameter	Method	Range	# of Tests	Page
HI98178BP Backpack Lab® Water Quality Educational Test Kit					
HI98196BP Backpack Lab® Soil Quality Educational Test Kit					
HI98198BP Backpack Lab® Marine Science Educational Test Kit					

Olive Oil Acidity Test Kit







Sensory Quality of Olive Oil

Additional Technical Information

Olive Oil Acid Composition

Acidity Test Kit

- Complete set
- High resolution
- Replacement reagents available

Significance of Use



Alkalinity Test Kit

- Complete set
- High resolution
- Replacement reagents available

Significance of Use

Ammonia Test Kit

for Fresh Water

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent dropper bottles.
- High resolution
  - Reading from 0.0 to 2.5 mg/L NH3-N are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit with consumables when reagents are exhausted. The HI3824-025 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI3824 Ammonia (as NH_3-N) in Fresh water
Type	colorimetric
Range	0.0 to 2.5 mg/L (ppm)
Resolution	0.5 mg/L (ppm)
Method	Nessler
Number of Tests	25 tests
Ordering Information	HI3824 test kit comes with 25 mL plastic sample cuvette, color comparison cube, 25 mL graduated cylinder, 1 dry chemical scoop, and 25 mL Nessler reagent
Reagents	HI3824-025 Nessler Reagent (25 mL)

Ammonia Test Kit

for Seawater

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent dropper bottles.
- High resolution
  - Readings from 0.0 to 2.5 mg/L NH3-N 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 HI3826-025 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI3826 Ammonia in Seawater
Type	colorimetric
Range	0.0 to 2.5 mg/L (ppm)
Resolution	0.5 mg/L (ppm)
Method	Nessler
Number of Tests	25 tests
Ordering Information	HI3826 test kit comes with 25 mL plastic sample cuvette, color comparison cube, 25 mL graduated cylinder, 1 dry chemical scoop, and 25 mL Nessler reagent
Reagents	HI3826-025 Nessler Reagent (25 mL)

Boron Test Kit

Complete set-up

- All required materials are included with the test kit, such as the sample beaker, pipette, pH adjustment reagent, and pocket pH meter.

Significance of Use

Bromine Test Kit

Significance of Use



Carbon Dioxide Test Kit

Chloride Test Kit

Significance of Use





Free Chlorine Test Kit

With Color Cube

The HI96709 is a colorimetric chemical test kit that determines the free chlorine concentration within a 0.00 to 0.50 mg/L (ppm) range. The HI96709 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for performing approximately 50 tests.

- Complete set up
  - 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 0.00 to 0.50 mg/L are determined to 0.01 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI96709-100 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 (Cl_2) is a very good antimicrobial and because of its low cost, it is widely used to disinfect drinking water. It reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl dissociates to form H^+ and OCl^-. Both HOCl and OCl^- are referred to as free chlorine. Free chlorine is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water treatment utilizes chlorine to kill water borne pathogens. Chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite are added to water supplies to oxidize iron and manganese, reduce color, eliminate bacteria and help prevent algae growth in the distribution system. The USEPA requires that a measurable chlorine residual be maintained throughout the distribution system. Chlorine is also used in wastewater treatment for odor control, oxygen demand reduction, and disinfection before discharge into receiving waters.



Specifications	HI96709 Free Chlorine (0.00 to 0.50 mg/L)
Type	colorimetric
Range	0.00 to 0.50 mg/L (ppm)
Resolution	0.01 mg/L (ppm)
Method	DPD
Number of Tests	50 tests
Ordering Information	HI96709 test kit comes with one colorimetric cube, 50 mL reagent A and 50 mL reagent B
Reagents	HI96709-100 replacement 50 tests kit

Free Chlorine Test Kit

Medium Range with Checker® Disc

- Complete set e.g.
  - All equipment is high quality and supplied with the correct, such as the glass vials, plastic, 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
  - These consumed reagents are manufactured. The HI93701-03R can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chlorination is a process of adding chlorine or chlorine compounds to pathogenic (disease-causing) microorganisms, such as bacteria, viruses and fungi, to kill them. Chlorine is a very reactive element that can react with many substances in water, including dissolved organic matter, iron and manganese. The most commonly used chlorine compounds are gaseous chlorine (Cl_2), hypochlorite ions (OCl⁻) and hypochlorous acid (HOCl). HOCl and OCl⁻ are collectively known as free chlorine.

Drinking water must be disinfected to make it safe to drink. Chlorine is the most widely used disinfectant for drinking water because it is relatively inexpensive and provides a residual that remains in the water after treatment. This residual helps protect the water from contamination as it travels through the distribution system. Chlorine is also used to disinfect wastewater effluent before it is discharged into receiving waters. The presence of residual chlorine in wastewater effluent can be toxic to aquatic life. Therefore, wastewater treatment facilities often dechlorinate their effluent before discharge.



Specifications	HI93701 Free Chlorine Test Kit
Type	colorimetric
Range	0.0 to 3.5 mg/L (ppm)
Sample Volume Required	10 mL (0.34 oz.)
Method	DPD
Number of Tests	100 tests
Ordering Information	HI93701 Free Chlorine Test Kit (100 tests)
Reagents	HI93701-03 Free Chlorine DPD Reagents (100 tests)

Free Chlorine Test Kit

Low and Medium Range with Checker® Disc

- Complete set e.g.
  - All equipment is included with the test kit, such as the glass vials, plastic, 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 0.7 to 3.5 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - These consumed reagents are manufactured. The HI93701-03R can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chlorination is a process of adding chlorine or chlorine compounds to pathogenic (disease-causing) microorganisms, such as bacteria, viruses and fungi, to kill them. Chlorine is a very reactive element that can react with many substances in water, including dissolved organic matter, iron and manganese. The most commonly used chlorine compounds are gaseous chlorine (Cl_2), hypochlorite ions (OCl⁻) and hypochlorous acid (HOCl). HOCl and OCl⁻ are collectively known as free chlorine.

Drinking water must be disinfected to make it safe to drink. Chlorine is the most widely used disinfectant for drinking water because it is relatively inexpensive and provides a residual that remains in the water after treatment. This residual helps protect the water from contamination as it travels through the distribution system. Chlorine is also used to disinfect wastewater effluent before it is discharged into receiving waters. The presence of residual chlorine in wastewater effluent can be toxic to aquatic life. Therefore, wastewater treatment facilities often dechlorinate their effluent before discharge.

Specifications	HI96701 Free Chlorine Test Kit
Type	colorimetric
Range	0.00 to 3.50 mg/L (ppm) 0.0 to 35.0 mg/L (ppm)
Sample Volume Required	5.0 mL (0.17 oz.) 10 mL (0.34 oz.)
Method	DPD
Number of Tests	100 tests
Ordering Information	HI96701 Free Chlorine Test Kit (100 tests) HI96701-01 Free Chlorine Reagents (100 tests), 2 Checker® discs, glass vials with caps (2) and 1 mL plastic dropper
Reagents	HI96701-03 Free Chlorine DPD Reagents (100 tests)

HI96707

Free & Total Chlorine Test Kit

Low and Medium Range with Checker® Disc

The HI96707 is a chemical test kit that determines the free and total chlorine concentration in two ranges: 0.00 to 2.50 mg/L and 0.0 to 10.0 mg/L. The HI96707 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate colorimetry. The test kit contains enough reagents to perform approximately 200 tests.

- Complete set up
  - 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 2.50 mg/L are determined to 0.02 mg/L resolution
  - Readings from 0.0 to 10.0 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 HI96707-200 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 sanitation, and food processing and sanitation. Chlorine gas is used directly as a bleaching and oxidizing agent. When the gas is dissolved in water, it forms hypochlorous acid (HOCl) and hydrochloric acid (HCl). Hypochlorous acid is a weak acid that partially dissociates into hydrogen ion and hypochlorite ion. Both hypochlorous acid and hypochlorite ion have disinfecting properties, but hypochlorous acid is a much stronger disinfectant than hypochlorite ion.

Free chlorine reacts with ammonia and organic compounds to form chloramine compounds. One would think that chloramines would have disinfecting capabilities comparable with free chlorine. Chloramines, together with the other nitrogen compounds, are responsible for the chlorine demand and the breakpoint curve. Combined chlorine is a much weaker disinfectant than free chlorine. Combined chlorine has a much higher dosage requirement, longer contact time, and a much higher susceptibility to pH levels.

Specifications	HI96707 Free & Total Chlorine (low)
Type	Colorimeter
Range	0.00 to 2.50 mg/L (ppm) 0.0 to 10.0 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 mg
Ordering Information	HI96707 Free & Total Chlorine (low) Kit in carrying case with HI93701-0 photometer, HI93701-11 cuvette cleaning cloth, 4 HI93701-0 cuvette adapters, 4 HI731318 glass sample cuvettes with caps, 2 HI731321 glass cuvettes with caps, 2 HI731331 plastic cuvettes, 2 HI731335 plastic cuvette caps, 2 HI731340 pipettes, 2 HI731342 pipette tips, 2 HI731343 pipette tips, 2 HI731344 pipette tips, 2 HI731345 pipette tips, 2 HI731346 pipette tips, 2 HI731347 pipette tips, 2 HI731348 pipette tips, 2 HI731349 pipette tips, 2 HI731350 pipette tips, 2 HI731351 pipette tips, 2

Total Chlorine Test Kit

with Color Cube

Significance of Use



Total Chlorine Test Kit

Extended Range

Significance of Use



Chromium Test Kit

Copper Test Kit

Significance of Use

Significance of Use

Formaldehyde Test Kit

Glycol Yes/No Test Kit



Total Hardness Test Kit

Total Hardness Test Kit

Significance of Use

Significance of Use





Total Hardness Test Kit

Low Range

Significance of Use

Total Hardness Test Kit

Medium Range

Significance of Use

Total Hardness Test Kit

High Range

Significance of Use

Hydrogen Peroxide Test Kit

Bleach Test Kit

Significance of Use

Significance of Use

Iron Test Kit

Medium Range with Color Cube

- Complete range
  - All required materials are included with the kit(s), such as the sample beaker, color comparison cube, and reagent pipettes
- High resolution
  - Readings from 0.00 to 5 mg/L are performed to 2 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are consumed. The HI96784 (50 pcs) can be ordered to replace the reagents supplied with the kit

Significance of Use



Iron Test Kit

Low Range with Checker® Disc

- Complete range
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent powders, and Checker® disc
- High resolution
  - Readings from 0.00 to 1.60 mg/L are determined to 0.02 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are consumed. The HI96779 (50 pcs) can be ordered to replace the reagents supplied with the kit

Significance of Use



Iron Test Kit

Medium Range with Checker® Disc

- Complete set up
  - All required materials are included with the test kit, such as the glass vials, plastic cuvette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 5.00 mg/L are determined to 0.01 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38043-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI38043 Iron (Fe^{2+} to Fe^{3+})
Type	Checker disc
Range	0.0 to 5.0 mg/L (ppm)
Smallest increment	0.1 mg/L (ppm)
Method	photometric
Number of tests	100 tests
Ordering Information	HI38043 Iron Checker® HC Kit (100 tests) with reagents, cleaning cloth, glass vials with caps and 10 mL plastic cuvettes
Reagents	HI38043-100 reagents (100 tests)

Iron Test Kit

High Range with Checker® Disc

- Complete set up
  - All required materials are included with the test kit, such as the glass vials, blank cuvette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 10.00 mg/L are determined to 0.01 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38048-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI38048 Iron (Fe^{2+} to Fe^{3+})
Type	Checker disc
Range	0.00 to 10.00 mg/L (ppm)
Smallest increment	0.01 mg/L (ppm)
Method	photometric
Number of tests	100 tests
Ordering Information	HI38048 Iron Checker® HR Kit (100 tests) with reagents, cleaning cloth, glass vials with caps and 10 mL plastic cuvettes
Reagents	HI38048-100 reagents (100 tests)

Nitrate Test Kit

Significance of Use



Nitrate Test Kit

for Soil and Irrigation Water



Nitrite Test Kit

- Complete set
  - All required materials are included with the test kit, such as the glass cuvettes, comparison color, and reagent packets
- High resolution
  - Readings from 0.01 to 1.0 mg/L are determined to 0.01 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3873-026 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Dissolved Oxygen Test Kit

- Complete set
  - All required materials are included with the test kit, such as the glass cuvettes, foil, foil holder and reagent holder, and calibrated syringe
- High resolution
  - Readings from 0.01 to 10.0 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 HI3810-026 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Ozone Test Kit

- Complete setup
  - All required materials are included with the test kit, such as the glass cells, glass cap, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.03 to 2.3 mg/L are determined to 0.01 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI93504-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Ozone is an oxidizing agent used in many industrial and consumer applications. In drinking water, ozone is used for manganese removal, iron removal and water that can be filtered out in the purification process, dissolved organic matter removal in drinking water that is responsible for producing odor and color can also be removed by ozone. Ozone also acts as a germicide and is used to destroy microorganisms such as cryptosporidium and bacteria.



Type	Checker disc
Range	0.03 to 2.3 mg/L ozone
Resolution	0.01 mg/L ozone
Method	DPD
Number of Tests	100 tests
Ordering Information	**HI93504** Test kit in carrying case with 100 pre-measured reagents, 100 mL graduated cylinder, Checker disc, glass cell with cap (2 pcs.) and instructions
Accuracy	**HI93504** ±0.02 mg/L ozone ±3% of reading

Phosphate Test Kits

with Color Cube

- Convenient setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube and reagent packets.
- High resolution
  - Readings from 0 to 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 HI3833-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Phosphates are present in a number of products that are used by humans every day. Some examples of how they're all phosphates are enhancing the flavor and freshness of soda drinks, as a buffering agent for controlling pH in pet food as well as being the leaning of our petroleum wastes as a sealing chemical from them. Phosphates are also commonly used in detergent and cleaning fluids because of their ability to soften water and increase soil flexibility.

Phosphates are particularly important for the growth and development of plant cells, and hence are one of the most common fertilizers used in agriculture. However, high concentrations of phosphates in agricultural runoff can cause serious environmental problems such as eutrophication of lakes and streams.



Type	colorimeter
Range	0 to 5 mg/L (ppm)
Resolution (or readout)	0.1 mg/L (ppm)
Method	ascorbic acid
Number of Tests	50 tests
Ordering Information	**HI3833** Test kit in carrying case with 50 mL graduated beaker, color comparison cube (5 colors), phosphate reagents
Accuracy	**HI3833-100** ±0.2 mg/L ±5% of reading

Phosphate Test Kits

with Checker® Disc

- Complete set-up
  - All required materials are included with the test kit, such as mixing vials, sample pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 3.00 mg/L are determined to 0.02 mg/L resolution.
  - Readings from 0.0 to 5.0 mg/L are determined to 0.1 mg/L resolution.
  - Readings from 0 to 50 mg/L are determined to 1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a whole kit when reagents are exhausted. The HI3833-25 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Salinity Test Kit

- Complete set-up
  - All required materials are included with the kit, such as the sample vial, indicator and reagent bottles, and cut-to-size syringe.
- High resolution
  - Readings from 0.0 to 40.0 g/kg are determined to 0.1 g/kg resolution.
- Replacement reagents available
  - There is no need to buy a whole kit when reagents are exhausted. The HI3833-25 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI3833-02 Phosphate per ISO 6
Type	Colorimeter
Range	0.00 to 3.00 mg/L (ppm) 0.0 to 5.0 mg/L (ppm) 0 to 50 mg/L (ppm)
Resolution/Increments	0.02 mg/L (ppm) 0.1 mg/L (ppm) 1 mg/L (ppm)
Method	ascorbic acid
Number of Tests	100 tests
Glassware Included	HI740036 (4 ml sample cuvette and cap (set of 2)), HI731331 (5 ml mixing vial), 1 cut-to-size syringe, 1 sample pipette, and 1 Checker® disc (pH, chlorine, phosphate, and nitrate)
Reagents	HI93713-01 (100 tests)

Specifications	HI3833 Salinity
Type	Titration
Range	0.0 to 40.0 g/kg (ppt)
Sample Volume Required	10 mL
Titration	Argentometric titration
Number of Tests	100 tests
Ordering Information	HI3833 Salinity Test Kit (includes: (1) 1 mL dispensing titrator, (2) titration vials, (1) 25 mL conical vial, pipet to transfer sample and 100 mL plastic mixing beaker with lid)
Reagents	HI3833-26 (100 tests), (1) 1 mL titrator

Silica Test Kit

High Range

- Complete testing
  - All required chemicals and glassware are included with the test kit, such as the glass vial, pipette, reagent beaker and pipette, and Citrate mixing cylinder, 100 ml, dia.
- High resolution
  - Readings from 0 to 40 mg/L are determined to 1 mg/L resolution
  - Readings from 0 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 HI96707-100 is recommended to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI96707 Silica (ea/Set)
Type	Colorimetric
Range	0.00 to 2.00 mg/L SiO2 0.0 to 40.0 mg/L SiO2
Sensitivity/Resolution	0.01 mg/L SiO2 0.1 mg/L SiO2
Method	Heteropoly blue
Number of Tests	100 tests
Reagents Supplied	HI96707-100 Silica reagent A (1 mL dichloroacetic acid), Silica reagent B (100 powder silica reagent), Ammonium bifluoride (1 mL reagent C), Citric acid (10 g powder reagent D)
Reagent	HI96707-100 Silica reagent A (1 mL), B (100 tests), C (1 mL), D (10 g)

Sulfate Test Kits

- Complete testing
  - All required chemicals are included with the test kit
  - Kit, 1x2.5 oz. flat glass vial, tube, plastic pipette, spoon, and reagent bottles and packets
- High resolution
  - Readings from 20 to 150 mg/L are determined to 1 mg/L resolution
  - Readings from 150 to 300 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 HI93720-01 can be ordered to replace the reagents supplied with the kit.

Significance of Use



Specifications	HI93720 Sulfate (ea/Set)
Type	Turbidimetric
Range	20 to 300 mg/L SO4 0.20 to 3.00 g/L SO4
Sensitivity/Resolution	1 mg/L SO4 10 mg/L SO4
Method	Barium Sulfate
Number of Tests	100 tests
Reagents Supplied	HI93720-A0 Sulfate reagent A (1 mL), Sulfate reagent B (1 mL), Conditioning reagent (10 mL powder), Citric acid (10 g powder reagent D), 10 mL plastic pipette and spoon
Reagent	HI93720-A0 Sulfate reagent A (1 mL), B (1 mL), C (10 mL), D (10 g)

Sulfate Test Kits

Low and High Range

- Complete set
  - All required materials are included with the tests, such as the conical beakers, syringes, test reagent bottles and pipette
- High resolution
  - Readings from 0.02 to 4.00 mg/L are determined to 0.01 mg/L resolution
  - Readings from 0.01 to 2.00 mg/L are determined to 0.01 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagent is consumed. The HI93227-01 can be ordered to replace the reagents supplied with the kit

Significance of Use

Sulfite Test Kit

- Complete set
  - All required materials are included with the test kit, such as the sample beakers, indicator and reagent bottles, and calibrated syringe
- High resolution
  - Readings from 0.10 to 20 mg/L are determined to 0.01 mg/L resolution
  - Readings from 0 to 300 mg/L are determined to 1 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI93227-02 can be ordered to replace the reagents supplied with the kit

Significance of Use





Specifications	HI93227 Sulfate (as SO4)
Type	Titration
Range	Low: 0.00 to 4.00 mg/L (ppm) High: 0.00 to 2.00 g/L (ppt)
Resolution/Increments	0.01 mg/L (ppm) 0.01 g/L (ppt)
Method	Barium chloride
Number of Tests	100 tests
Ordering Information	HI93227-01 Sulfate reagents for 100 tests, 4 x 30 mL HI 93227A-01 sulfate reagent, 1 x 30 mL HI 93227B-01 sulfate reagent, 2 mL conical beakers, 2 mL syringe, 10 mL sample cuvette with cap, 10 mL graduated cylinder, 4 x 1.5 mL centrifuge tubes, 1 x 5 mL syringe with tip
Reagents	HI93227-01 sulfate reagents for 100 tests

Specifications	HI93227 Sulfite (as SO_3^{2-})
Type	Titration
Range	0.0 to 300 mg/L (ppm)
Resolution/Increments	0.1 mg/L (ppm) 1 mg/L (ppm)
Method	Iodometric
Number of Tests	100 tests
Ordering Information	HI93227 sulfite reagents for 100 tests, sulfuric acid solution (2 x 15 mL), iodine titrant solution (1 x 30 mL), starch indicator solution (1 x 15 mL), 2 mL conical beakers, 2 mL syringe, 10 mL cuvette with cap, 10 mL graduated cylinder, 4 x 1.5 mL centrifuge tubes, 1 x 5 mL syringe with tip
Reagents	HI93227-02 sulfite reagents for 100 tests

Hanna Soil Test Kit



Specifications	HI 3896 Professional Agriculture Test Kit				
Tests	Type	Range	Smallest Increment	Method	Number of Tests
Nitrogen	colorimetric	Extra Low, Medium, High	-	leaf	25 only
Phosphorus	colorimetric	Extra Low, Medium, High	-	ascorbic acid	25 only
pH	colorimetric	4 to 8 pH	-	phenolphthalein	25 only
Potassium	turbidimetric	Extra Low, Medium, High	-	tetraphenylboron	25 only
Ordering Information	HI 3896 Professional Agriculture Test Kit in a durable plastic carrying case with dividers for reagents, glassware and instruments. Supplied with 25 tests each for N, P & K, pH Buffer 4.01 & 7.01, 10 mL graduated cylinder and instruction manual				
Reagents	HI 3896-100 Nitrogen reagents, sufficient for 100 tests				

Quick Soil Test Kit



Specifications	HI 3895 Basic Agriculture Test Kit				
Tests	Type	Range	Smallest Increment	Method	Number of Tests
Nitrogen	colorimetric	Extra Low, Medium, High	-	leaf	25 only
Phosphorus	colorimetric	Extra Low, Medium, High	-	ascorbic acid	25 only
pH	colorimetric	4 to 8 pH	-	phenolphthalein	25 only
Potassium	turbidimetric	Extra Low, Medium, High	-	tetraphenylboron	25 only
Ordering Information	HI 3895 Basic Agriculture Test Kit in a durable plastic carrying case with dividers for reagents, glassware and instruments. Supplied with 25 tests each for N, P & K, pH Buffer 4.01 & 7.01, 10 mL graduated cylinder and instruction manual				
Reagents	HI 3895-100 Nitrogen reagents, sufficient for 100 tests				

Boiler & Feedwater Test Kit



Significance of Use



Cooling and Boiler Test Kit

Significance of Use

Test	Type	Range	Standard Treatment	Method	Number of Tests
Ordering information					
Reagents					

Environmental Monitoring Test Kit

Ideal for Professionals and Students



Significance of Use

Specifications	HI83314 Environmental Monitoring Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Calibration					
Testing Methodology					
Reagents					



Marine Test Kit

Test	Type	Range	Method	Number of Tests
Reagents				



Quick-Check Swimming Pool Test Kit

Free Chlorine and pH

Significance of Use

Test	Type	Range	Resolution	Method	Number of Tests
Free Chlorine	color matrix	0 to 3 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 mg
pH	color matrix	6.0 to 8.4 pH	0.2 pH	phenol red	100 mL
Comparator					
Reagents					



Water Quality Test Kit

Accurate and Reliable Water Quality Tests

Test	Type	Range	Resolution	Method	Number of Tests
Alkalinity (as $CaCO_3$)	titration	0-400 mg/L (ppm) 0-8.00 meq/L (ppm)	1 mg/L (ppm) 0.02 meq/L (ppm)	phenolphthalein/bromocresol green	100 reag.
Hardness (Ca+Mg)	titration	0-300 mg/L (ppm) 0-6000 mg/L as $CaCO_3$	1 mg/L (ppm) 50 mg/L (ppm)	calmagite	100 reag.
Hardness (Ca)	titration	0-200 mg/L (ppm) 0-4.00 meq/L (ppm)	1 mg/L (ppm) 0.02 meq/L (ppm)	EDTA	100 reag.
iron	colorimetric	0-1.00 mg/L (ppm)	0.01 mg/L (ppm)	phenanthroline	50 reag.
pH	electrometric	0.0-14.0 pH	0.1 pH		25 x 0.5 ml sachets
Total Chlorine (Cl$_2$)	titration	0.00-10.00 mg/L (ppm) 0-200 meq/L (ppm)	0.05 mg/L (ppm) 2 meq/L (ppm)	iodometric	100 reag.

Dimensions: 400 x 310 x 200 mm (15.7 x 12.2 x 7.9")

Ordering Information: **HI 83827** Water Quality Test Kit in a plastic carrying case complete with instruments and reagents for 100 tests for each parameter (except for 50 tests for iron).

Reagents:

HI 93721-100 Alkalinity (P/M) reagents (100 tests)	**HI 93716-01** pH 4.01 buffer solution (25 mL sachets) (25)
HI 93701-100 Chloride (Cl$^-$) reagents (100 tests)	**HI 93710-01** pH 7.01 buffer solution (25 mL sachets) (25)
HI 93762-100 Hardness (Ca+Mg) reagents (100 tests)	**HI 93703-50** pH 10.01 buffer solution (25 mL sachets) (25)
HI 93734-100 Iron (Fe) reagents (100 tests)	**HI 93711-100** Calmagite reagents (100 tests)


9
Chemical Test Kits
Backpack Lab
backpacklab.com
A Classroom in a Backpack!

Backpack Lab® Water Quality Educational Test Kit

Backpack Lab® Water Quality Educational Test Kit Includes:

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Specifications	[illegible]
Test	Type	Range	Method	Number of Tests	Individual Kit Reorder Code
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Specifications	[illegible]
Type	Range	Resolution	Accuracy	Calibration
[illegible]				

Ordering Information	[illegible]
Reagents and Solutions only	[illegible]

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9
Chemical Test Kits
Backpack Lab
A Classroom in a Backpack!

Backpack Lab® Soil Quality Educational Test Kit

Backpack Lab® Soil Quality Educational Test Kit Includes

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Type	Range	Resolution	Accuracy	[illegible]	
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A Classroom in a Backpack!

Backpack Lab® Marine Science Educational Test Kit

Backpack Lab® includes:

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Specifications	[illegible]
Type	Range	Resolution	Accuracy	Calibration
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Ordering Information	[illegible]
Reagents and Solutions only	[illegible]

9

Chemical Test Kits

Chemical Test Kit Reagents

HI Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests
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	[illegible]	[illegible]	[illegible]	[illegible]
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	[illegible]	[illegible]	[illegible]	[illegible]
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HI [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
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	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
HI [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]

Chemical Test Kit Reagents

CTK Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Chemical Test Kits

Chemical Test Kit Reagents

CHE Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests

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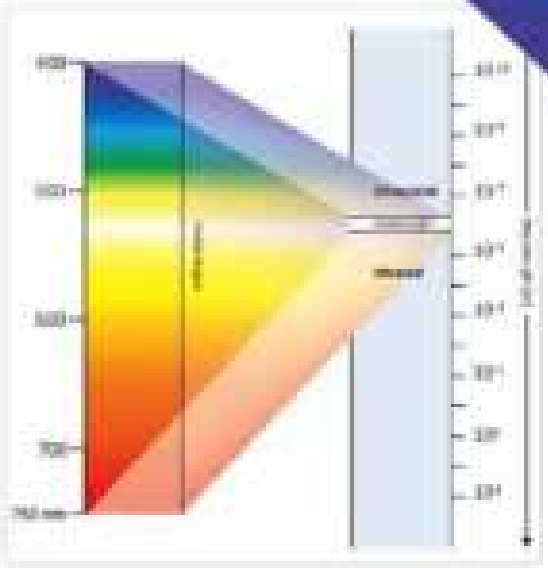
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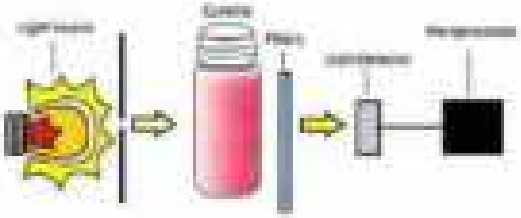


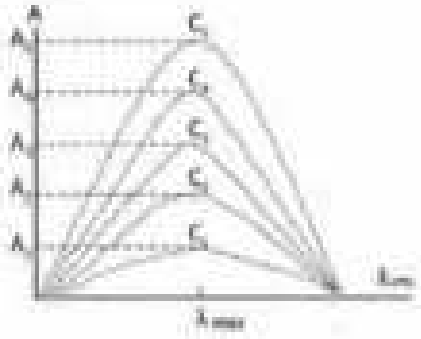
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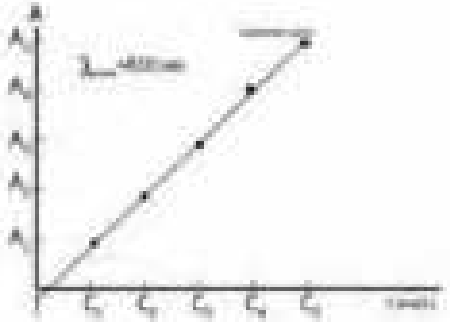


Colorimetry









Sources of light used by Hanna colorimeters:

Tungsten lamp an incandescent lamp having a tungsten filament

LED light emitting diode



10 Product Spotlights

Photometers

Product Spotlights

Multiparameter Photometer for Laboratories



Multiparameter Photometer for Environmental Testing



Multiparameter Photometer for Pools and Spas





Chlorine, Free Ultra High Range Portable Photometer



Fluoride Low Range and High Range

Handheld Colorimeters



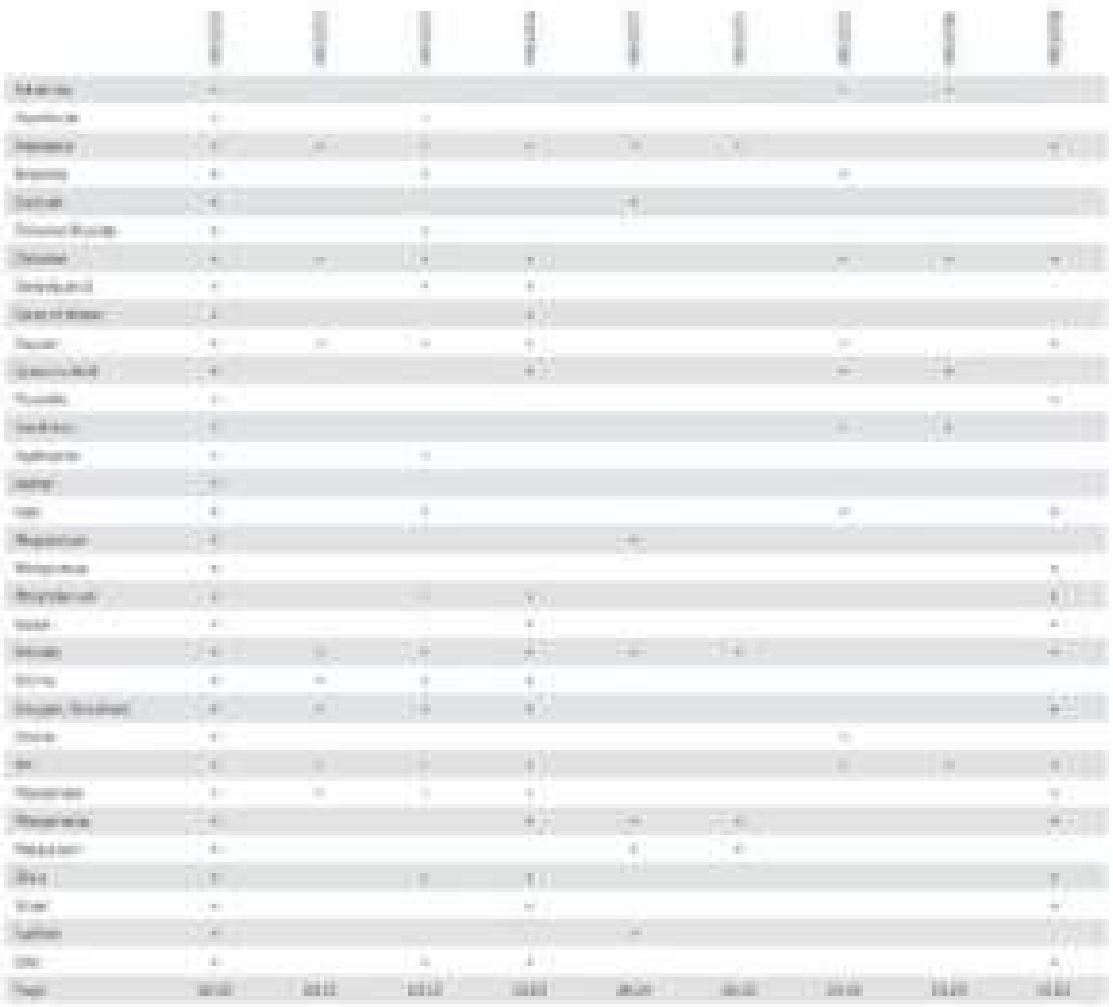
Maple Syrup Digital Grader

Handheld Colorimeter

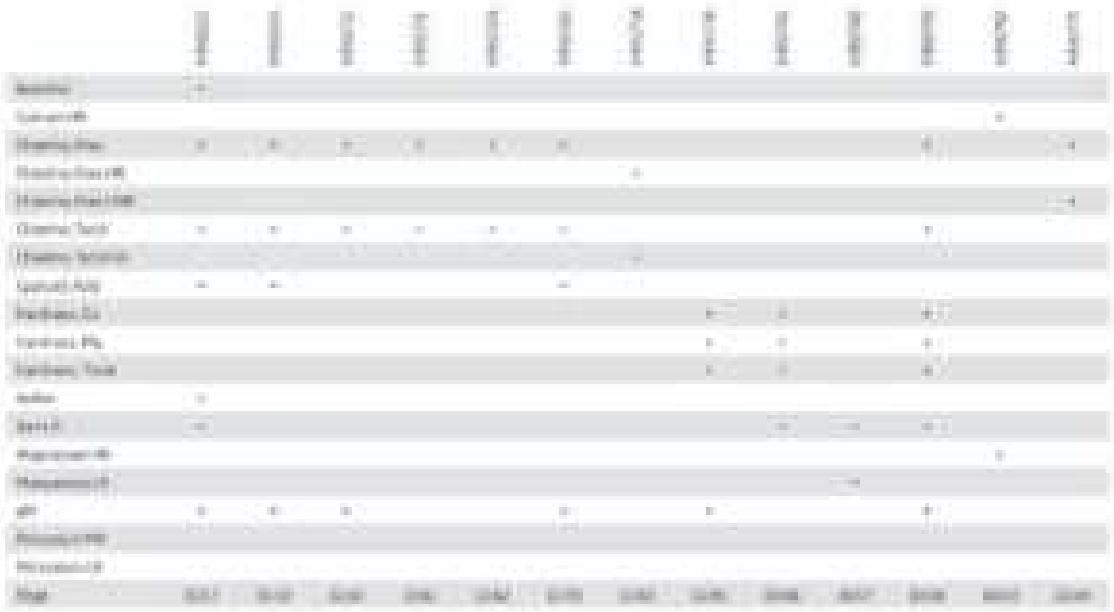
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Multiparameter Benchtop Photometers Comparison Guides

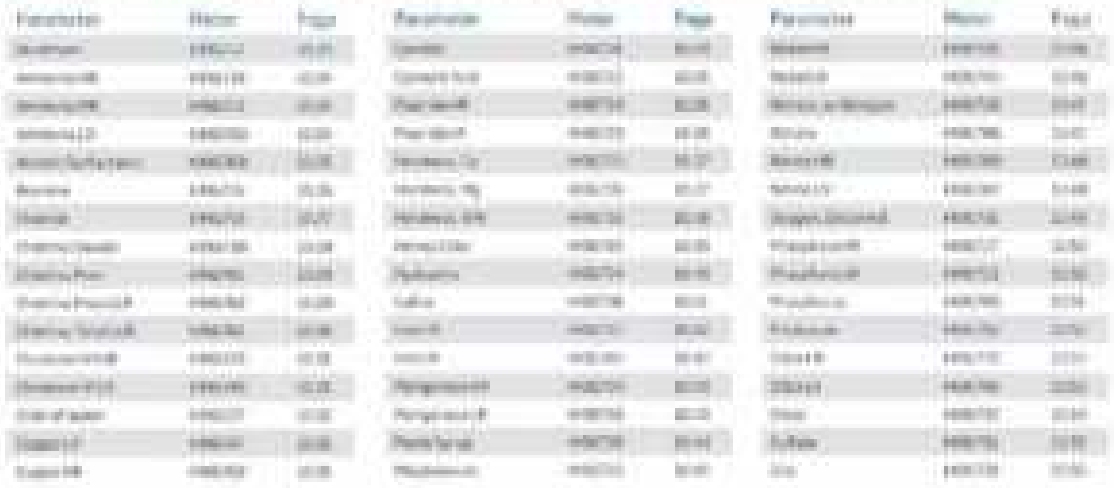
Photometers



Multiparameter Portable Photometers Comparison Guides



Single Parameter Portable Photometers Comparison Guide



Wine and Olive Oil Measurement Photometers



10

Photometers

Benchtop

Multiparameter Bench Photometers



Advanced Optical System





Narrow band interference filter wavelengths

Specifications

Ordering Information

10

Photometers

Benchtop

Multiparameter Photometer for Laboratories



Test	Range	Method	Reagent Code



Multiparameter Photometer for Aquaculture

10

Photometers

Multiparameter Photometer for Boilers and Cooling Towers



Test	Range	Method	Reagent Code
Aluminum			
Ammonia HR		Nessler	
Ammonia LR		Nessler	
Bromine		DPD	
Chlorine Dioxide		chlorophenol red	
Chlorine Free		DPD	
Chlorine Total		DPD	
Chromium VI HR		diphenylcarbohydrazide	
Chromium VI LR		diphenylcarbohydrazide	
Copper HR		bicinchoninate	
Copper LR		bicinchoninate	
Hydrazine		p-dimethylaminobenzaldehyde	
Iron HR		phenanthroline	
Iron LR		TPTZ	
Phosphorus		molybdovanadate	
Silica		heteropoly blue	
Silica HR		Reducing Agent	
Silica LR		Reducing Agent	
Sulfite		DPD	
pH		phenol red	
Phosphate HR		ascorbic acid	
Phosphate LR		ascorbic acid	
Urea		formamidinase	
Zinc		zincon	

Ordering Information

ADP

Application Design and Performance



Multiparameter Photometer for Environmental Testing

- Methods
  - 24 factory-stored methods
- Help Features
  - Full tutorial available on-screen
- Connectivity
  - PC compatible via USB

The HI83206 is a multiparameter bench photometer dedicated to environmental testing. It is preset to test parameters such as pH, dissolved oxygen, chlorine, ammonia, chromium, copper, chlorine, pesticides, iron, nitrate, nitrite, phosphate, sulfate, zinc and more using 24 different methods.

The optical system of the HI83206 is based on a single tungsten lamp and narrow band interference filters to guarantee both high performance and reliable results.

The HI83206 has a powerful on-screen help system that assists the user during the analysis process. A full tutorial is available at the touch of a key, and the Help Menu provides assistance for every step of the measurement process. The meter can be connected to a PC via a USB cable, where the data can be downloaded with the optional HI92000 Windows® compatible software.

Test	Range	Method	Reagent (qty)
ammonia (NH3)	0.00 to 3.00 mg/L (ppm)	Nessler	HI93715-01
ammonia (LR)	0.00 to 2.50 mg/L (ppm)	Nessler	HI93700-01
Aluminum	0.00 to 1.00 mg/L (ppm)	ECR	HI93712-01
Chromium	0.00 to 1.00 mg/L (ppm)	ECR	HI93717-01
Chromium VI	0 to 1000 µg/L	diphenylcarbohydrazide	HI93723-01
Chromium VI	0 to 300 µg/L	diphenylcarbohydrazide	HI93749-01
Cyanuric Acid	0 to 70 mg/L	turbidimetric	HI93722-01
Copper HR	0.00 to 5.00 mg/L (ppm)	bicinchoninate	HI93702-01
Copper LR	0 to 1000 µg/L	bicinchoninate	HI93747-01
Cyanuric Acid	0 to 70 mg/L (ppm)	turbidimetric	HI93722-01
Fluoride	0.00 to 2.00 mg/L (ppm)	SPADNS	HI93729-01
Iodine	0.0 to 12.5 mg/L	DPD	HI93718-01
Iron HR	0.00 to 5.00 mg/L (ppm)	TPTZ	HI93721-01
Iron LR	0 to 1000 µg/L	TPTZ	HI93746-01
Manganese	0.00 to 3.00 mg/L (ppm)	PAN	HI93709-01
Molybdenum	0.00 to 40.0 mg/L (ppm)	mercaptoacetic acid	HI93730-01
Nickel	0.00 to 7.00 mg/L (ppm)	dimethylglyoxime	HI93740-01
Nitrate	0.0 to 30.0 mg/L (ppm)	cadmium reduction	HI93728-01
Nitrite HR	0.00 to 150 mg/L (ppm)	ferrous sulfate	HI93708-01
Nitrite LR	0.000 to 1.000 mg/L (ppm)	diazotization	HI93707-01
Oxygen, Dissolved (DO)	0.0 to 10.0 mg/L (ppm)	Winkler	HI93732-01
pH	6.5 to 8.5 pH	phenol red	HI93710-01
Phosphate HR	0.00 to 30.00 mg/L (ppm)	ascorbic acid	HI93713-01
Phosphate LR	0.00 to 2.50 mg/L (ppm)	ascorbic acid	HI93706-01
Phosphorus	0.00 to 25.0 mg/L (ppm)	ammonium	HI93717-01
Silica	0.00 to 2.00 mg/L (ppm)	heteropolyblue	HI93705-01
Silver	0.000 to 1.000 mg/L (ppm)	PAR	HI93737-01
Zinc	0.00 to 3.00 mg/L (ppm)	Zincon	HI93731-01

Ordering information: HI83206-02 (115 V) and HI83206-03 (230 V) are supplied with cuvette holder, 4 cuvettes (Mod. 920005P), 2 cuvette caps (Mod. 920052), USB cable, stirrer, software and instruction manual.



Application Development Photometers

www.hannainst.com | HANNA instruments

10

Photometers

Benchtop

Nutrient Analysis Photometer for Greenhouses and Hydroponics





Nutrient Analysis Photometer

- Methods
  - 32 measurement methods
- Key features
  - Multi-cuvette adaptation and vial adapter
- Connectivity
  - PC compatible via USB

Deciding which fertilizer to use can be overwhelming, but with a bit of knowledge you can be sure your garden will get the right amount of nutrients it needs. The first question you'll need to answer is, "What nutrient is actually in need?" The nutrient analysis is actually three numbers you see usually at the middle or bottom of fertilizer packages (for example 10-20-10). These numbers represent percentages of the three major nutrients plants need, nitrogen, phosphorus and potassium (N-P-K for short).

The HI83213 nutrient photometer kit from Hanna Instruments features methods in low, medium and high ranges essential for monitoring plant health and hydroponics applications.

The optical system of the HI83213 is based on tungsten lamps and narrow band interference filters to guarantee both high performance and reliable results.

The HI83213 has been built to be user-friendly and aid the user during the analysis process. A full tutorial is available in the Setup Menu and the Help Menu provides instructions for every step of the measurement process. This meter can be connected to a PC using a USB cable where the data can be managed with optional HI92000 Windows® compatible software.

Test	Range	Method	Reagent(s)
Ammonia HR	0.00 to 10.00 mg/L (ppm)	Nessler	HI93715-01
Ammonia MR	0.00 to 10.00 mg/L (ppm)	Nessler	HI93733-01
Ammonia LR	0.00 to 2.50 mg/L (ppm)	Nessler	HI93700-01
Nitrate HR	0 to 500 mg/L (ppm)	cadmium reduction	HI93728-01
Nitrate MR	0.0 to 50.0 mg/L (ppm)	cadmium reduction	HI93728-01
Nitrate LR	0.00 to 30.00 mg/L (ppm)	cadmium reduction	HI93728-01
Phosphate HR	0.00 to 30.00 mg/L (ppm)	ascorbic acid	HI93706-01
Phosphate MR	0.00 to 10.00 mg/L (ppm)	ascorbic acid	HI93706-01
Phosphate LR	0.00 to 2.50 mg/L (ppm)	ascorbic acid	HI93706-01
Potassium HR	0 to 300 mg/L (ppm)	turbidimetric	HI93750-01
Potassium MR	0.0 to 30.0 mg/L (ppm)	turbidimetric	HI93750-01
Potassium LR	0.00 to 3.00 mg/L (ppm)	turbidimetric	HI93750-01

Ordering Information

HI83213-01: 220V and HI83213-02: 230V supplied with wrist strap, universal adapter, USB cable, stirrer, 4 AA cell power adapter and instrument case

ADP

Application Development Photometers

10

Photometers

Suction Lysimeter for Root Level Soil Monitoring



Plant Nutrition

Ordering Information	
Accessories	

The Significance of Pool and Spa Water Testing

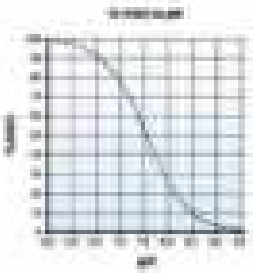


Residual Disinfection and pH Control

Chlorine

Bromine

Ozone



10

Photometers

The Significance of Pool and Spa Water Testing

The Water Balance and Langelier Index

Calcium

Alkalinity

pH

Langelier Index



Multiparameter Photometer for Pools and Spas

- 13 measurement methods

- Full-featured waterproof

- HI 92000 compatible via USB

Test	Range	Method	Reagent (cat.#)
Alkalinity	0 to 300 mg/L (ppm) as $CaCO_3$	Bromocresol green	HI93755-01
Bromine	0.00 to 10.00 mg/L (ppm)	DPD	HI93716-01
Chlorine, Free	0.00 to 5.00 mg/L (ppm)	DPD	HI93701-01
Chlorine, Total	0.00 to 5.00 mg/L (ppm)	DPD	HI93711-01
Copper, Free	0.00 to 5.00 mg/L (ppm)	Colorimetric	HI93702-01
Copper, Total	0.00 to 5.00 mg/L (ppm)	Colorimetric	HI93767-01
Cyanuric Acid	0 to 100 mg/L (ppm)	Turbidimetric	HI93722-01
Hardness, Calcium	0 to 300 mg/L (ppm) as $CaCO_3$	Colorimetric	HI93720-01
Iron	0.00 to 5.00 mg/L (ppm)	Phenanthroline	HI93721-01
Ozone	0.00 to 1.00 mg/L (ppm)	DPD	HI93757-01
pH	6.5 to 8.5 pH	Phenol red	HI93710-01
Ordering Information	HI83225-01 (115 VAC) HI83225-02 (230 VAC) supplied with sample cuvettes with caps, 4 AA batteries, instruction manual, 25 mL square cuvette filled with solution for zero reference, and carrying case		

ADP

Application Development Photometers

10

Photometers

Multiparameter Photometer for Pools and Spas





Multiparameter Photometer for Water Conditioning

10

Photometers

Portable Photometers



"C" versions include CAL Check™ standards and a rigid carrying case

CAL Check™ Validation®

Two-step validation procedure for proper calibration

CAL Check™ Calibration®

Calibrate your instrument quickly and easily



Aluminum Portable Photometer

Significance of Use

Specifications	
Range	
Resolution	
Accuracy @25°C (77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	

10

Photometers

Portable

Ammonia Portable Photometers



Significance of Use



Anionic Surfactants Portable Photometer

Significance of Use

10

Photometers

portable

Bromine Portable Photometer



Significance of Use

Specifications	HI96710 Bromine
Range	
Resolution	0.01 mg/L
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Power Supply	9V battery
Auto-Off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Accessories	



Chloride Portable Photometer

Significance of Use

Range	
Resolution	
Accuracy (@25°C/77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	

10

Photometers

Portable

Chlorine Dioxide Portable Photometer





Free Chlorine Portable Photometers

- On Demand
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
  - Automatic shut-off after 10 minutes of non-use which increases battery preservation mode. Prevents wastage of batteries in the event the meter is accidentally left on
- 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 and audible alerting to problems including method, high limits and overload/out of range
- Cooling fan indicator
  - The manufacturing of these photometers to be used for absorbance. It is necessary to turn the instrument on and off several times from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling fan indicator is displayed prior to a measurement being taken
- Units of measure
  - Appropriate unit of measure is displayed along with the reading

Significance of Use

Specifications	HI96701 Free Chlorine	HI96702 Free Chlorine ULR
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Power Supply		
Auto-Off		
Environment		
Dimensions		
Weight		
Method		
Ordering Information		
Reagents and Standards	HI96701-11	
	HI96701-01	
	HI96701-03	
	HI96702-11	
	HI96702-01	
	HI96702-03	

The HI96701 portable photometer is for the measurement of free chlorine while the HI96702 measures free chlorine ultra low range in a wide variety of water samples. Manned portable photometers feature an advanced optics system that consists of a warm-up tungsten lamp, a narrow band interference filter and silicon photocells to measure accurate photometric readings every time. The Chemical Check (CAL Check™) feature utilizes ready-made NIST traceable standards to verify both meter calibration and calibration. The meter's users can be setting system ensures that the user is reminded when the measurements are taken using calibrated standards.

10

Photometers

Portable

Chlorine, Total Portable Photometers



Significance of Use

Specific where	
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light source	
Light detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Battery	
Ordering Information	
Reagents and Accessories	



Chromium VI HR and LR Portable Photometers

Significance of Use

Specifications		
Range		
Resolution		
Light Source		
Power Supply		
Dimensions		
Weight		
Ordering Information		
Reagents and Standards		

10

Photometers

Portable

Color of Water Portable Photometer



Significance of Use

Specifications	
Range	
Resolution	
Accuracy	
Light Source	
Light Detector	
Power Supply	
Auto-Off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	
Accessories	



Copper, Low and High Range Portable Photometers

- CAL Check
  - Allows for performance verification and calibration of the meter using HI97 traceable standards
- GLP
  - Review of the last calibration data
- Auto shut off
  - Activated or shut off after 10 minutes of non use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on
- 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 kind being performed
- Error messages
  - Messages and audible alerting to problems including method, high errors and overload/out of limit
- Cooling fan activated
  - To evaporate the dew and avoid fogging to be used for absorbance. It is necessary to let the components and cuvettes cool from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling fan operation is displayed on the screen while being taken
- Units of measure
  - Appropriate unit of measure is displayed along the reading

Significance of Use

Due to its great versatility, the iron and also it has conductivity, extremely reactive and easily oxidized to a variety of oxidation and biochemical transformations. Copper may also be present in rock and water and is a fluorescent compound that is used in the analysis of iron and other biological systems.

Specifications	HI 96747 Copper, LR	HI 96748 Copper, HR
Range	0.000 to 5.000 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)
Resolution	0.001 mg/L	0.01 mg/L (ppm)
Accuracy @ 25°C (77°F)	±0.050 mg/L (ppm) @ 2.500 mg/L	±0.05 mg/L (ppm) @ 2.50 mg/L
Light Source	tungsten lamp	
Light Detector	silicon photocell with interference filter at 610 nm	silicon photocell with interference filter at 575 nm
Power Supply	9V battery	
Auto-off	after 10 minutes of non use the instrument shuts off automatically to preserve battery life	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	161 x 67 x 68 mm (6.3 x 2.6 x 2.7")	
Weight	300g (10.7 oz)	
Method	adapted from the USEPA approved for wastewater analysis	adapted from the USEPA approved for wastewater analysis
Ordering Information	HI 96747 is supplied with one pair of matched cuvettes, CAL Check™ instructions, quick reference guide and a 9V battery. HI 96748 is supplied with one pair of matched cuvettes, CAL Check™ instructions, quick reference guide and a 9V battery. HI 96747-11 and HI 96748-11 (120/230 VAC) universal plug power supply with multiple adapters for worldwide use.	
Reagents and Standards	HI 96747-11 CAL Check™ standard solution	
	HI 96747-50 reagents for 50 tests	
	HI 96747-01 reagents for 100 tests	
	HI 96748-11 CAL Check™ standard solution	
	HI 93702-50 reagents for 50 tests	
	HI 93702-01 reagents for 100 tests	

The HI 96747 and HI 96748 portable photometers are for the measurement of copper in a wide variety of water samples. The instruments feature an advanced optical system, the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The measurement is fully CAL Check™ feature allows easily verification of the instrument's optical system using certified standards. In addition, the cuvette locking system ensures that the cuvette is oriented into the measurement cell in the same position every time to maintain a consistent path length.

10

Photometers

Portable

Cyanide Portable Photometer



Significance of Use

Specifications	HI96714 Cyanide
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light source	
LED Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Protection	
Ordering Information	
Reagents and Accessories	



Cyanuric Acid Photometer

Significance of Use

Specifications	
Range	
Resolution	
Accuracy (@ 25°C)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	

10

Photometers

portable

Fluoride Portable Photometers



Significance of Use

Specifications	HI96729 Fluoride LR	HI96734 Fluoride HR
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Power Supply		
Auto-off		
Environment		
Dimensions		
Weight		
Kit(s)		
Ordering Information		
Reagents and Solutions		



Hardness Standard Method Portable Photometers

- On/Off
  - Allows for performance verification and calibration of the meter using HI97 traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Activates shut-off after 15 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- 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 and audible alerting to problems including method, high limits and overload/no light.
- Cooling fan indicator
  - Illuminates the display and reminds to be aware for abnormalities. It is necessary to let the instrument cool down between readings and from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling fan indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Type/Photometer	Ca Hardness	Mg Hardness
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Power Supply		
Auto-off		
Environment		
Dimensions		
Weight		
Method		
Ordering Information		
Reagents and Accessories		

The HI96735 portable photometer is for the measurement of calcium hardness while the HI97715 measures magnesium hardness. Hanna's portable photometers feature an advanced optical system, the combination of a special tungsten lamp, a narrow bandwidth interference filter, and silicon photodetector ensure accurate photometric readings every time. The Meter-to-Method QA Check™ feature provides easily-made, NIST traceable standards to verify both meter validation and calibration. The instrument will be locked out from use if the user fails to read the correct value. The measurement cell in the sample cuvette ensures a consistent path length.

10

Photometers

Portable

Hardness, EPA Portable Photometer



Significance of Use

Specifications	HI96735 Hardness, Total		
	Low Range (0 to 300 mg/L)	High Range (300 to 1000 mg/L)	Extended Range (0.00 to 10.00 g/L)
Range	0 to 300 mg/L CaCO3	300 to 1000 mg/L CaCO3	0.00 to 10.00 g/L CaCO3
Resolution	1 mg/L from 0 to 300 mg/L 5 mg/L from 300 to 1000 mg/L	1 mg/L from 0 to 300 mg/L 5 mg/L from 300 to 1000 mg/L	5 mg/L from 1000 to 10.00 g/L
Accuracy @ 25°C (77°F)	±3 mg/L ±3% of reading	±7 mg/L ±3% of reading	±30 mg/L ±3% of reading
Light Source	High efficiency LEDs		
Light Detector	Silicon photodiode with narrowband interference filter at 466 nm		
Power Supply	9V battery		
Auto-Off	After 10 minutes of non-use (can be disabled or set to 5, 30 or 60 minutes)		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	160 x 76 x 39 mm (6.3 x 3 x 1.5")		
Weight	180g (6.3 oz)		
Housing	Rugged ABS plastic with rubber protection (IP67)		
Ordering Information	HI96735 is supplied with reagents for 150 tests (50 x 3 tests), 10 mL sample cuvette with cap, 9V battery, instrument quality control solution and instruction manual.		
Reagents and Standards	HI93735-11 Calcium Hardness reagents		
	HI93735-100 reagents for 100 tests (100 mg/L)		
	HI93735-101 reagents for 100 tests (500 mg/L)		
	HI93735-102 reagents for 100 tests (1000 mg/L)		
	HI93735-0 reagents for 100 tests (Blank)		



Honey Color Portable Analyzer

- Auto-shut-off
  - Automatic shut-off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator

The HI 96785 portable analyzer is for the determination of honey color. Hanna's portable photometers feature an advanced optical system. The combination of a special tungsten lamp, interference filters and silicon photodiodes ensures accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted in the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

The primary characteristic for commercial honey classification is color. Color ranges are expressed in millimeters (mm) Pfund as compared to an already established glass grade of color reference.

The natural color of honey can vary considerably from almost colorless to amber, dark amber to almost black with colors at the extremes. The color of each packaged honey is dependent upon the floral source used by the bees. For this reason, the color often shows one to consistently identify the original floral source.

The color of honey tends to darken with age or if not processed according to the method of certain physical production quality considerations. There are no commercially available uses of old beehives, contaminated honey, the natural colors of contamination and improper storage.

The HI 96785 uses direct measurement to determine honey color and ranges from 0 to 140 mm Pfund. This photometer has a tungsten lamp with an interference filter to isolate the 420 nm and 525 nm wavelengths. All samples are measured in a square cuvette holder to maintain path length consistency. The light source, detector, interference filters and cuvette holder are housed in a rugged, compact, ergonomic design. The operator just inserts a sample blank and a sample and presses a button. The meter automatically calculates the absorbance ratio and displays the color in mm Pfund.

The honey grade set is used to the USDA classification for honey samples and must be used with this product.

USDA Color Standards Designations	Color Range Pfund Scales (mm)
Water white	0 to 9 mm
Extra white	Over 9 mm including 17
White	Over 17 mm including 34
Extra light amber	Over 34 mm including 50
Light Amber	Over 50 mm including 85
Amber	Over 85 mm including 114
Dark amber	Over 114

Specifications	HI 96785
Range	0 to 140 mm Pfund
Resolution	1 mm Pfund
Accuracy @ 25°C (77°F)	±3 mm Pfund @ Pfund 114 mm
Light Source	Tungsten lamp
Light Detector	photodiode (with 420 nm and 525 nm interference filters)
Power Supply	9V battery
Auto-off	after 10 minutes of non-use
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	180 x 104 x 60 mm (7.1 x 4.1 x 2.4")
Weight	300 g (10.7 oz)
Meets	USDA standards
Ordering Information	HI 96785 supplied with cuvette holders (2), 9V battery, test tube cleaning brush, cuvette wiping cloth, operating manual and certificate of quality
Accessories	HI 731318 pH 4.01 Buffer
	HI 731320 pH 7.01 Buffer
	HI 731321 Cleaning solution for tubes and cuvettes (230 mL)

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Photometers

portable

Hydrazine Portable Photometer



Significance of Use

Type/Features	
Range	
Resolution	
Accuracy	
Light source	
Light detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Pillbox	
Ordering Information	
Reagents and Accessories	



Iodine Portable Photometer

Significance of Use

Specifications	HI96710 Iodine
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	HI96710-01
	HI93716-01
	HI93716-03

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Iron Portable Photometers



Significance of Use

Specifications		
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light source		
Light Detector		
Power Supply		
Auto-Off		
Environment		
Dimensions		
Weight		
Protection		
Ordering Information		
Reagents and Standards		



Manganese Portable Photometers

- City Check
  - Allows for performance verification and calibration of the meter using HI7 traceable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
  - Activates shut-off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on
- 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 and audible alerting to problems encountered during testing. High ions and contamination flag
- Drinking Water Mode
  - Two models that allow zero wavelength to be used for absorbance. This necessary function compensates and corrects for the light generated by the tungsten lamp. Each procedure is designed to allow a minimal amount of time for components to react. The reading may vary due to displayed color or the reading being taken
- Units of measure
  - Appropriate unit of measure is displayed along with the reading

Specifications	Manganese, LR	Manganese, HR
Range		
Resolution	0.1 ppm	10 ppb
Accuracy @ 25°C/77°F	±0.2 ppm ± 3% of reading	±20 ppb ± 3% of reading
Light source	tungsten lamp	
Light detector	photodiode with narrow band interference filter at 525 nm	
Power Supply	9V battery	
Auto-off	after 10 minutes of non-use in measurement mode, after 1 minute of non-use in other modes, can be disabled	
Environment	0 to 50°C (32 to 122°F); 0 to 95% RH non-condensing	
Dimensions	160 x 130 x 65 mm (6.3 x 5.1 x 2.6")	
Weight	300 g (10.7 oz)	
Method	reagents of the HI 93748 Manganese LR Reagent Kit react with manganese in the sample producing a violet color	reagents of the HI 93758 Manganese HR Reagent Kit react with manganese in the sample producing a violet color
Ordering Information	HI 93748 is supplied with sample cuvettes (2 pcs), caps, 9V battery, instruction manual and quick guide in a foam-lined carrying case HI 93748-01 and HI 93758-01 are supplied with sample cuvettes (2 pcs), caps, 9V battery, instruction manual and quick guide in a foam-lined carrying case	
Reagents and Standards	HI 93748-01	City Check™ standard solution
	HI 93748-03	reagents for 100 tests
	HI 93758-03	reagents for 100 tests
	HI 93758-01	City Check™ standard solution
	HI 93758-51	reagents for 50 tests
	HI 93758-03	reagents for 100 tests

10

Photometers

portable

E-44

Maple Syrup Portable Photometer



Maple Syrup Quality



Molybdenum Portable Photometer

Significance of Use

10

Photometers

portable

Nickel Portable Photometers





Nitrate Portable Photometers

- Lab Check
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration data
- Auto shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on
- Battery status indicator
  - Indicates the amount of battery life left
- Countdown
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction time for the test being performed
- Interferences
  - Messages and display warning in presence of possible interferences
- Calibration indicator
  - Screen shows the default wavelength to be used for calibration. It is necessary to ensure components are not overexposed from the light generated by the tungsten lamp. Each photometer is designed to allow a minimum amount of time for components to cool. The cooling time indicator displays when prior to a reading being taken
- Ease of Operation
  - Appropriate unit of measure is displayed along with reading

Significance of Use

Specifications	HI96728 Nitrate Mini Photometer	HI96770 Nitrate
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Wavelength		
Auto-Off		
Environment		
Dimensions		
Weight		
Housing		
Ordering Information		
Reagents and Consumables		

10

Photometers

portable

Nitrite Portable Photometers



Significance of Use



Dissolved Oxygen Portable Photometer

- On Demand
  - Allows for performance verification and calibration of the meter using HI97142 measure standards
- GLP
  - Review of the last calibration date
- Auto-shut off
  - Automatic shut-off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on
- 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 and codes alerting to problems including reagent, high ions and overranged limit
- Cooling long wavelength
  - Removes the short wavelength to be used for absorbance. It is necessary to ensure temperature are not overheated from the heat generated by the tungsten lamp. Each procedure is designed to allow a minimal amount of time for components to cool. The cooling long wavelength is displayed prior to a reading being taken
- Units of measure
  - Appropriate unit of measure is displayed along with reading

Significance of Use

Specifications	HI98732 Oxygen, Dissolved
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	

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10

Photometers

Portable

Phosphate Portable Photometers



Significance of Use

Specifications	Phosphate LR	Phosphate HR
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Power Supply		
Auto-off		
Environment		
Dimensions		
Weight		
Method		
Ordering Information		
Reagents and Standards		



Phosphorus Portable Photometer

- Qty Check
  - Allows for performance verification and calibration of the meter using HI97 reusable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
  - Automatic shut-off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on
- 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 and audible alerting to problems including method, high error and overload error
- Cooling fan activation
  - To evaporate the dew and avoid light to be used for absorbance. It is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each parameter is designed to allow a minimal amount of time for components to cool. The cooling fan operation is displayed on the screen while being taken
- Selection of measure
  - Appropriate unit of measure is displayed along with the reading

Significance of Use

Common in natural systems, such as lakes, oceans, and soil, phosphorus is an essential element for plant and animal growth. However, when present in large concentrations, phosphate can cause problems in living systems and aquatic life. In addition, with excessive nutrients, a high amount of phosphorus can be detrimental to fish and plants. The main source of phosphorus in water systems is through runoff that is introduced naturally from soil. It is also a product of sewage, detergents, and industrial wastewater. Phosphorus is also responsible for corrosion in boilers and cooling towers. Phosphorus is also responsible for corrosion in piping systems. Control is important in many industries, such as food and beverage, textiles, and pulp and paper.

Type of Analysis	HI97713 Phosphorus
Range	0.00 to 5.00 mg/L (ppm)
Resolution	0.01 mg/L
Accuracy @ 25°C (77°F)	±0.04 mg/L ±3% of reading
Light Source	Long-life tungsten
Light Detector	silicon photocell with narrow band interference filter at 525 nm
Power Supply	9V battery
Auto-off	after 10 minutes of non-use or 60 minutes after last key press
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions	160 x 134 x 70 mm (6.3 x 5.3 x 2.7")
Weight	290 g (10.1 oz)
Housing	Rugged ABS with water resistance rating of IP67 when closed and splash, dust and dirt proof design
Ordering Information	HI97713 is supplied with sample cuvettes (2 pcs), 9V battery, instrument qualification kit (cuvette and reagent), and instruction manual HI97713C includes photometer, 25 mL Direct Sample cuvettes (2 pcs), reagents (2 pouches), cuvette cloth for wiping, safety glasses, quality certificate, and instruction manual packed in a carrying case
Reagents and Standards	HI93706-11 25 mL Direct™ cuvettes (25 pcs) HI93706-01 reagents for 100 tests HI93706-03 reagents for 300 tests

Meets all applicable requirements of the European Directive 2014/30/EU for Electromagnetic Compatibility (EMC).

10

Photometers

portable

Potassium Portable Photometer





Silica Portable Photometers

- CAL Check
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration data
- Auto-shut off
- Battery status indicator
- Auto-timer
  - Display of time remaining before a measurement is taken. Indicates that all readings are taken at the appropriate reaction time and for the test being performed
- Error messages
  - Messages are displayed alerting to problems including: no cap, high error, and overload conditions
- Contingency indicator
- Calibration reminder
  - Appropriate unit of measure is displayed along with reading

Type of Photometer	Silica	Silica HR
Range		
Resolution		
Accuracy @ 25°C (77°F)		
Light Source	Tungsten lamp	tungsten lamp
Light Detector	silicon photodiode with narrow bandpass interference filter @ 525 nm	silicon photodiode with narrow bandpass interference filter @ 525 nm
Power Supply	9V battery	
Auto-off	after 5 minutes of non-use to save power; choice of 1 or 10 minutes; can be disabled	
Environment		
Dimensions		
Weight		
Method		
Reagents and Consumables		

Silver Portable Photometer



Significance of Use

Specifications	
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Housing	
Ordering Information	
Reagents and Accessories	



Sulfate Portable Photometer

Significance of Use

Specifications	HI96701 Sulfate
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Power Supply	
Auto-off	
Environment	
Dimensions	
Weight	
Method	
Ordering Information	
Reagents and Standards	HI96701-11
	HI96701-03
	HI96701-01

10

Photometers

Zinc Portable Photometer



Significance of Use



Bromine, Chlorine, Cyanuric Acid, Iron Iodine and pH Portable Photometer

- CAL Check
  - Allows for performance verification and calibration of the meter using HI97xxx-11 standards
- Auto-shut off
- Error prevention
  - Display of cuvette positioning before measurement is taken

Bromine, Free and Total Chlorine, Cyanuric Acid, Iron, Iodine and pH instrument in water and wastewater samples. The reagents are in powder and liquid form depending on the parameter and are supplied in dropper bottles and pillows.

Hanna's portable photometers feature an advanced optical system (incorporation of a special tungsten lamp, a narrow band interference filter, and a silicon photodiode) to ensure accurate photometric readings every time. The Hanna exclusive CAL Check™ feature, patented multi-wells, and cuvette rotation to verify both instrument error and calibration. The product will come in its sturdy carrying case, so that the user has to take only one piece of equipment out in the field and the entire kit is ready to use in a convenient, quick design.

Specifications			
		pH (Pro)	Chlorine (Free) (HI97701) & Total Chlorine (HI97711)
Absorption Specifications	Range	0 to 14.00 pH	0.00 to 5.00 mg/L (ppm)
	Resolution	0.1 pH	0.01 mg/L (ppm) under 3.00 mg/L 0.02 mg/L (ppm) over 3.00 mg/L
	Accuracy @25°C (77°F)	±0.1 pH	±0.03 mg/L ±3% of reading
		Cyanuric Acid (HI97726)	Iodine (HI97718)
	Range	0 to 80 mg/L (ppm)	0.00 to 12.50 mg/L (ppm)
	Resolution	1 mg/L	0.01 mg/L
	Accuracy @25°C (77°F)	±3 mg/L ±10% of reading	±0.15 mg/L ±5% of reading
		Bromine (HI97716)	Iron LR (HI97721)
	Range	0.00 to 5.00 mg/L (ppm)	0.00 to 1.99 mg/L (ppm)
	Resolution	0.01 mg/L	0.01 mg/L
	Accuracy @25°C (77°F)	±0.03 mg/L ±3% of reading	±0.02 mg/L ±3% of reading
Additional Specifications	Light Source	Tungsten lamp	
	Light Detector	silicon photodiode with narrow bandwidth interference filters at 525 nm	
	Power Supply	9V battery	
	Auto-off	after two minutes of non-use (can be disabled)	
	Environment	0 to 50°C (32 to 122°F) RH max 95% non-condensing	
	Dimensions	194x91x37mm (7.6x3.6x1.5")	
	Weight	280g (9.87 oz)	
	Method	Bromine: 4-aminophenol DPD. Chlorine: colorimetric method of reaction with Cyanuric Acid: turbidimetric method with melamine. Iodine: reaction of the hydrolyzed DPD with iodine. Iron: reaction with TPTZ. pH: Phenol Red method	
Ordering Information	HI97701 is supplied with two sample cuvettes, CAL Check™ standard, instruction manual and carrying case.		
	HI97711/01 is supplied with two sample cuvettes, CAL Check™ standard, 25 reagents, a pipette, stirring rods, dry testing chemicals and instruction manual with quick reference guide.		

Reagents and Standards	
HI97701-11	CAL Check™ standard, Free Cl2
HI97711-11	CAL Check™ standard, Total Cl2
HI97716-11	CAL Check™ standard, pH
HI97718-11	CAL Check™ standard, Iodine
HI97721-11	CAL Check™ standard, Iron
HI97726-11	CAL Check™ standard, Cyanuric Acid
HI97731-11	CAL Check™ standard, Nitrite
HI97732-11	CAL Check™ standard, Nitrate
HI97734-11	CAL Check™ standard, Ammonia
HI97736-11	CAL Check™ standard, Phosphate
HI97738-11	CAL Check™ standard, Sulfate
HI97739-11	CAL Check™ standard, Hardness
HI97742-11	CAL Check™ standard, Nitrite HR
HI97743-11	CAL Check™ standard, Nitrate HR
HI97744-11	CAL Check™ standard, Ammonia HR
HI97746-11	CAL Check™ standard, Phosphate HR
HI97748-11	CAL Check™ standard, Sulfate HR
HI97750-11	CAL Check™ standard, Hardness HR

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Photometers

Portable

pH, Free and Total Chlorine and Cyanuric Acid Portable Photometer





Chlorine, Cyanuric Acid and pH Portable Photometer

for Legionella Protection

Significance of Use

Specifications

		Chlorine, Free (DPD)	**Chlorine, Total (DPD)**
Photometric Specifications	Range		
	Resolution		
	Accuracy @ 25°C (77°F)		
		Cyanuric Acid (CYA)	**pH (pH)**
	Range		
	Resolution		
	Accuracy @ 25°C (77°F)		
General Specifications	Light Source		
	Light Detector		
	Power Supply		
	Auto-pH		
	Environment		
	Dimensions		
	Weight		
	Method		
Ordering Information			

Reagents and Accessories

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Photometers

portable

Free and Total Chlorine and pH Portable Photometer



Significance of Use



Chlorine, Free and Total Portable Photometer

- Dry Check
  - Allows for performance verification and calibration of the meter using HI97 Traceable standards
- Auto-shut off
- Bright screen
  - Display of countdown timer before measurement is taken

The HI96771 portable photometer is for the measurement of free and total chlorine. Hanna's portable photometers feature an advanced optical system, the combination of a specific long-life lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive Dry Check™ feature utilizes ready-made, NIST traceable standards to verify both the wavelength calibration. The exclusive cuvette rotation system ensures that the cuvette is positioned in the same manner each time for maximum consistency.

Significance of Use

Specifications	HI96771 Free and Total Chlorine		
Range	Chlorine, Free (FL)	Chlorine, Total (FL)	
Resolution			
Accuracy @ 25°C (77°F)			
Light Source			
Light Detector			
Power Supply			
Auto-off			
Environment			
Dimensions			
Weight			
Protection			
Ordering Information	HI96771		
Reagents and Standards			

10

Photometers

Free and Total Chlorine Portable Photometer





Free and Total Chlorine, High Range Portable Photometer

Significance of Use

Free Chlorine Ultra High Range Portable Photometer



Significance of Use

Specifications	HI96771 Free Chlorine and Ultra High Range	
Range	Free Cl2 Pro	UL Low (LR)
Resolution		
Accuracy @ 25°C (77°F)		
Light Source		
Light Detector		
Power Supply		
Auto-Off		
Environment		
Dimensions		
Weight		
Method		

Ordering Information	
HI96771	
HI96771C	

Reagents and Standards	
HI93701-01	
HI93701-03	
HI93771-01	
HI93771-03	
HI93771-11	



Total Hardness and pH Portable Photometer

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Photometers

portable

Total Hardness and Iron, Low Range Portable Photometer



Significance of Use



Iron, Low Range and Manganese Low Range Portable Photometer

- Cal Check
  - Allows the performance verification and calibration of the meter using HI97 Checkstar standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96750 portable photometer measures low range iron and manganese.

Hanna's portable photometers feature an advanced optical system that combination of a special tungsten lamp, a narrow band interference filter, and silicon photodiode to ensure accurate photometric readings every time. The Hanna-exclusive CAL Check™ feature utilizes easily stable, NIST traceable standards to verify both meter calibration and calibration. The result is a user-friendly, reliable instrument that will give the same positive every time to make an accurate and lasting.

Specifications

		Iron LR (P2)	Manganese LR (P2)
Operating specifications	Range	0 to 1.60 mg/L (ppm)	0 to 300 µg/L (ppb)
	Resolution	0.01 mg/L	1 µg/L
	Accuracy @ 25°C (77°F)	±0.05 mg/L ±5% of reading	±2 ppb ±5% of reading
General specifications	Light Source	Tungsten lamp	
	Light Detector	Silicon photodiode with narrow band interference filters @ 525 nm	
	Power Supply	9V battery	
	Auto-off	After 3 minutes without use or 10 minutes after last reading	
	Environment	0 to 50°C (32 to 122°F); Max 95% RH non-condensing	
	Dimensions	159 x 231 x 80 mm (6.3 x 9.1 x 3.2")	
	Weight	600 g (20.7 oz)	
	Method	Iron LR adapted from 11 Phen Method; Manganese LR adapted from PAN Method	
Ordering information	HI96750	Iron and Manganese Low Range Portable Photometer with reagents and glassware in carrying case	
Reagents and Standards	HI93761-11	Iron LR Cal Check™ standard solution, 5 mL	
	HI93796-50	Manganese LR reagent (50 tests)	
	HI93749-50	Manganese LR reagent (50 tests)	
	HI93748-11	CAL Check™ standard solution, 5 mg/L Mn	
	HI93749-50	Manganese LR reagent (50 tests)	
	HI93749-50	Manganese LR reagent (50 tests)	

Significance of Use

Iron and manganese are considered dangerous. Overnight contaminants of these metals in water can create a brownish color and unpleasant taste.

The presence of iron in supplied water is a most cost drains the cleaning effect in laundry and plumbing.

Manganese, in large concentrations, can produce a coloration of cooking utensils which is a serious consumer concern.

10

Photometers

Portable

Total Chlorine, Hardness, Iron Low Range and pH Portable Photometer



- CAL Check
  - Allows for performance verification and calibration of the meter using HI 7 traceable standards
- Auto-shut-off
- Built-in timer
  - Display of time measuring before a measurement is taken

The HI 96 715 is a powerful, hand-held unit for measuring chlorine, total hardness and iron in low range and pH in portable models.

Significance of the

Chlorine and pH are two of the most important parameters to monitor in water quality tests. Hardness is also an important parameter, as it is widely regulated, as excess and lack of it can be problematic. Iron is also a key parameter to monitor in water for its effects on taste and clarity.

Specifications		HI 96 715 Chlorine, Total Hardness, Iron Low Range and pH
		pH (PS)	**Chlorine, Free (FS) Chlorine, Total (PS)**
Photometer Specifications	Range	6.5 to 8.5 pH	0.00 to 3.50 mg/L (ppm)
	Resolution	0.1 pH	0.01 mg/L (ppm) below 2.00 mg/L 0.02 mg/L (ppm) above 2.00 mg/L
	Accuracy @ 25°C (77°F)	±0.1 pH	±0.05 mg/L ± 3% of reading
		Total Hardness (Ca+Mg)	**Iron, Low Range (FS)**
	Range	0.00 to 4.50 mg/L (ppm)	0.00 to 1.00 mg/L (ppm)
	Resolution	0.01 mg/L	0.02 mg/L
	Accuracy @ 25°C (77°F)	±0.20 mg/L ±5% of reading	±0.03 mg/L ±3% of reading
Additional Specifications	Light Source	long-life LED
	Light Detector	silicon photodiode with interference filter at 525 nm
	Power Supply	9V battery
	Auto-off	after two minutes of non-use or measurement mode; can be set to off or can remain on continuously; when set to auto-off, a warning will appear
	Environment	0 to 50°C (32 to 122°F); Max 95% non-condensing
	Dimensions	195x160x85mm (7.7x6.3x3.3")
	Weight	400g (14.1 oz)
	Method	pH: phenol red; 570 nm; DPD; Chlorine: 525 nm; DPD; Total Hardness: calmagite; 570 nm; Ca2+ and Mg2+ ions react with calmagite to form a red complex; EDTA is added and Ca2+ ions react first; when all Ca2+ ions have reacted, Mg2+ ions react; the end point is detected when the color changes from red to blue; Iron: 610 nm; FerroVer®; Fe2+ ions react with FerroVer® reagent in proportion to the iron concentration; the solution becomes more intensely colored as more iron is present
Ordering Information	HI 96 715	Portable photometer for Chlorine, Total Hardness, Iron Low Range and pH in carrying case with reagents and accessories for 25 tests each

Reagents and Standards

HI 93701-01	CAL Check™ standard solution (4 mL x 5)
HI 93701-55	reagents for 100 tests (Free Cl)
HI 93701-03	reagents for 100 tests (Total Cl)
HI 93718-11	CAL Check™ standard solution (25 mL)
HI 93718-01	reagents for 100 tests (pH)
HI 93718-03	reagents for 100 tests (Iron)
HI 93713-11	CAL Check™ standard solution (10 mL x 2)
HI 93713-01	reagents for 100 tests (Iron)
HI 93713-03	reagents for 100 tests (Total Hardness)
HI 93710-11	CAL Check™ standard solution (25 mL)
HI 93710-01	reagents for 100 tests (Free Cl)
HI 93710-03	reagents for 100 tests (Total Cl)
HI 93716-11	CAL Check™ standard solution (10 mL x 2)
HI 93716-01	reagents for 100 tests (Total Hardness)
HI 93716-03	reagents for 100 tests (Iron)

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Photometer, reagents and accessories are packaged in a durable carrying case. Each reagent set includes all necessary reagents and glassware for the number of tests indicated. Meets CE requirements.



Calcium and Magnesium Portable Photometer

Significance of Use

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Standard Reagents

Photometers

Test	Reagent Kit	No. of Tests
Alkalinity	HI 755-26 HI 755-03	25 300
Aluminum	HI 713-25 HI 713-03	25 300
Ammonia LR	HI 733-25 HI 733-03	25 300
Ammonia MR	HI 715-25 HI 715-03	25 300
Ammonia HR	HI 700-25 HI 700-03	25 300
Bromine	HI 716-25 HI 716-03	25 300
Calcium	HI 751-25 HI 751-03	25 300
Chloride and Magnesium	HI 753-25 HI 753-03	25 tests 300 tests
Chlorine	HI 711-25 HI 711-03	25 300
Chlorine Dioxide	HI 717-25 HI 717-03	25 300
Chlorine Gas	HI 712-25 HI 712-03	25 300
Chlorine, Free and Total	HI 93711-01 HI 93711-03 HI 93711-F Capsule	100 300 300
Chlorine, Free and Total Low Range	HI 93734-01 HI 93734-03	100 300
Chlorine, Free LR	HI 93762-25 HI 93762-03	25 300
Chlorine, Total	HI 93711-01 HI 93711-03 HI 93711-F Capsule	100 300 300
Chlorine, Total LR	HI 93761-01 HI 93761-03	100 300
Chromium VI HR	HI 93723-01 HI 93723-03	100 300
Chromium VI LR	HI 93749-01 HI 93749-03	100 300
Copper HR	HI 93702-01 HI 93702-03 HI 93702-F Capsule HI 93767-01 (0.5 mL) HI 93767-03 (1 mL)	100 300 300 100 300
Copper LR	HI 93747-01 HI 93747-03	100 300
Cyanide	HI 93714-01 HI 93714-03	25 300
Cyanuric Acid	HI 93722-01 HI 93722-03	100 300
Detergents, Anionic	HI 95769-01	50
Fluoride HR	HI 93729-01 HI 93729-03	100 300
Fluoride LR	HI 93707-01 HI 93707-03	100 300
Glycine Reagent	HI 93705-10	100
Hardness, Calcium	HI 93720-01 HI 93720-03	100 300

Test	Reagent Kit	No. of Tests
Hardness, Chromium and Cobalt Interferences	HI 93719-01 HI 93719-03	100 300
Hardness, Easy HR Hardness, Easy MR Hardness, Easy LR Hardness, Easy Ultra-Low HR	HI 93735-03 HI 93735-01 HI 93735-02 HI 93735-0	200 100 100 200
Hydrazine	HI 93704-01 HI 93704-03	100 300
Iodine	HI 93718-01 HI 93718-03	100 300
Iron HR	HI 93721-01 HI 93721-03	100 300
Iron LR	HI 93746-01 HI 93746-03	25 100
Manganese HR	HI 93709-01 HI 93709-03	100 300
Manganese LR	HI 93748-01 HI 93748-03	100 300
Nickel HR	HI 93726-01 HI 93726-03	100 300
Nitrate HR	HI 93728-01 HI 93728-03	100 300
Nitrite LR	HI 93708-01 HI 93708-03	100 300
Nitrogen, Ammonia	HI 93700-01 HI 93700-03	100 300
Nitrogen, Total LR	HI 93767-01 HI 93767-03	100 300
Ozone	HI 93757-01 HI 93757-03	100 300
pH	HI 93710-01 HI 93710-03	100 300
Phosphate HR	HI 93717-01 HI 93717-03	100 300
Phosphate LR	HI 93713-01 HI 93713-03	100 300
Phosphorus	HI 93758-01 HI 93758-03	100 300
Potassium	HI 93750-01 HI 93750-03	100 300
Silica HR	HI 93770-01 HI 93770-03	100 300
Silica LR	HI 93705-01 HI 93705-03	100 300
Silver	HI 93737-01 HI 93737-03	100 300
Sulfate	HI 93751-01 HI 93751-03	100 300
Zinc	HI 93731-01 HI 93731-03	100 300

CAL Check™ Standard Reagents

Single Parameter

Instrument	CAL Check™ Standard Set	Parameter
HI83200	HI83750-11	Alkalinity
HI83731	HI83731-11	Free Chlorine
HI83214	HI83214-11	Copper
HI83749	HI83749-11	Hydrazine
HI83214	HI83705-11	Iodine
HI83399	HI83750-11	Phosphorus
HI83214	HI83731-11	Iodine
HI83749	HI83708-11	Ammonia
HI83214	HI83706-11	Nitrate
HI83214	HI83713-11	Nitrite
HI83214	HI83714-11	Ozone
HI83214	HI83716-11	Peracetic Acid
HI83214	HI83718-11	Phosphate
HI83214	HI83719-11	Potassium
HI83214	HI83720-11	Silica
HI83214	HI83721-11	Sulfate
HI83214	HI83722-11	Sulfite
HI83214	HI83723-11	Surfactants (Anionic)
HI83214	HI83724-11	Urea
HI83214	HI83725-11	Zinc
HI83214	HI83726-11	Total Chlorine (HR)
HI83214	HI83727-11	Chromium VI
HI83214	HI83728-11	Free Halogens (Cl2, Br2, I2)
HI83214	HI83729-11	Nickel
HI83214	HI83730-11	Cyanuric Acid
HI83214	HI83731-11	Free Chlorine
HI83214	HI83732-11	Total Chlorine
HI83214	HI83733-11	Glycol
HI83214	HI83734-11	Peracetic Acid
HI83214	HI83735-11	Phenols
HI83214	HI83736-11	Phosphonates
HI83214	HI83737-11	Silver
HI83214	HI83738-11	Quaternary Ammonium
HI83214	HI83739-11	Peroxide
HI83214	HI83740-11	Nitrite
HI83214	HI83741-11	Iron
HI83214	HI83742-11	Oxygen
HI83214	HI83743-11	Phosphorus
HI83214	HI83744-11	Chromium VI
HI83214	HI83745-11	Potassium
HI83214	HI83746-11	Sulfide
HI83214	HI83747-11	Chloride
HI83214	HI83748-11	Total Hardness
HI83214	HI83749-11	Total Alkalinity
HI83214	HI83750-11	Free and Total Chlorine
HI83214	HI83751-11	Ammonia (Ammoniacal Nitrogen)
HI83214	HI83752-11	Nitrate
HI83214	HI83753-11	Ultra-Low Range Phosphate
HI83214	HI83754-11	Silicon

Multiparameter

Instrument	CAL Check™ Standard Set	Parameter
HI83200	HI83758-11 HI83731-11 HI83752-11 HI83706-11 HI83749-11 HI83759-11	Alkalinity Free Chlorine Total Chlorine Cyanuric Acid Iodine pH
HI83214	HI83759-11 HI83731-11 HI83732-11 HI83733-11	pH Free Chlorine Total Chlorine Cyanuric Acid
HI83749	HI83731-11 HI83732-11 HI83759-11	Free Chlorine Total Chlorine pH
HI83399	HI83731-11 HI83732-11	Free Chlorine Total Chlorine
HI83214	HI83731-11 HI83732-11 HI83733-11 HI83759-11	Free Chlorine Total Chlorine Cyanuric Acid pH
HI83214	HI83734-11	Free Chlorine Total Chlorine
HI83214	HI83735-11	Hardness
HI83214	HI83739-11 HI83759-11	Total Hardness pH
HI83214	HI83709-11 HI83710-11	Total Hardness Iron
HI83214	HI83746-11 HI83749-11	Iron Manganese
HI83214	HI83748-11 HI83759-11	Iron pH
HI83214	HI83759-11 HI83709-11 HI83746-11	pH Total Hardness Iron
HI83214	HI83731-11 HI83732-11 HI83734-11 HI83746-11 HI83759-11	Free Chlorine Total Chlorine Total Hardness Iron pH
HI83214	HI83752-11 HI83754-11	Calcium Magnesium

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Photometers

Photometer for the Determination of Concentration of Reducing Sugars





Supplied in a rigid carrying case

Significance of Use

Specifications	HI83749
Range	
Resolution	
Accuracy @ 25°C/77°F	
Precision	
Light Source	
Light Detector	
Method	
Environment	
Battery Type	
Auto Shut-off	
Dimensions	
Weight	
Ordering Information	
Optional Accessories	



The HI83749 requires the HI839800 Test Tube Heater



10

Photometers

Photometer for the Determination of Tartaric Acid in Wine





Supplied in a rigid carrying case

Significance of Use

Specifications	
Range	
Resolution	
Accuracy @ 25°C/77°F	
Light Source	
Photometer	
Light Detector	
Method	
Environment	
Battery Type	
Auto Shut-Off	
Dimensions	
Weight	
Ordering Information	
Reagent Sets	

10

Photometers

Photometer for the Determination of Peroxide Value in Olive Oils





Supplied in a rigid carrying case

Significance of Use

Specifications	
Range	
Resolution	
Accuracy @ 25°C/77°F	
Light Source	
Light Detector	
Method	
Environment	
Power Supply	
Auto Shut-off	
Dimensions	
Weight	
Ordering Information	
Reagent Sets	



10

Photometers

Checker HC

Hanna Checker® HC Series

Handheld Colorimeters







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

Calibration Checking Sets

Seawater and Fresh Water Alkalinity

Handheld Colorimeters



10

Photometers

Ammonia Low, Medium and High Range

Handheld Colorimeters





Bromine

Handheld Colorimeter

- Easy to use and simple to operate
- DPD method
- Accuracy ±0.1 ppm @ 1% of reading
- 0.1 ppm resolution
- Large color backlit display
- Auto shut-off

- Tests starting at single spoonful
- Designed to work with Hanna's powder reagents
- Uses 10 mL glass cuvettes

- Small size, big convenience
- Weighs just more than 6 oz (170 g), the Checker HC easily fits into the palm of your hand or pocket
- Rugged, no-moving-parts design
- Operated by a single AAA battery

- Ideal for
- Home testing
- Education
- Swimming pools/hot tub sanitization
- Environmental

The HI736 Checker HC is a simple, accurate, and cost effective way to measure Bromine. Designed as a lower cost entry point to chemical testing, the HI736 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 the button to zero.

Step Three - Remove sample and add reagent packet.

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

The HI736 uses an adaptation of the standard methods for the Examination of Water and Wastewater, 4500 with Iso, DPD method. The reaction between Bromine and the reagent causes a color shift in the sample.

Type/Resolution	HI736
Range	0.00 to 6.00 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	±0.1 ppm @ 1% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photodiode
Wavelength	1 wavelength @ 525 nm (±2.5°C, 20 minutes/Min. reading)
Battery Type	(1) 1.5 V AAA
Auto-off	after 5 min. (disabled if zero set)
Dimensions	3.5 x 2.5 x 1.5" (9 x 6.4 x 4 cm)
Weight	6.4 oz (180 g)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 4500 with Iso, DPD method. The reaction between Bromine and the reagent causes a color shift in the sample.
Ordering Information	HI736 Checker HC is supplied with cuvette, instruction manual, CR2032 battery and quick start guide
Reagents Kit	HI736-25 (25 tests)
Calibration Set	HI736-11

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Photometers

Marine Calcium

Handheld Colorimeter







Chloride

Handheld Colorimeter

- Easy to use and ideal for on-site field measurements
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Drinking water
  - Aquatic water
  - Water and cooling towers

The HI753 Chloride HI-PIC is a simple, accurate and cost effective way to measure Chloride. Designed as a more economical alternative to showing a test kit, the HI753 provides quick, accurate results in three easy steps.

Step One - Prepare samples according to the manual.

Step Two - Insert prepared sample into Chloride HI-PIC, press and hold the button for 3 seconds to start reaction timer. Meter will zero automatically.

Step Three - Remove vial from meter and insert sample. Press the button to measure your results.

The HI753 uses an adaptation of the mercuric(II) thiocyanate method.

Specifications	HI753
Range	0.0 to 20.0 mg/L
Resolution	0.1 mg/L
Accuracy @25°C/77°F	±1.5 mg/L ±5% of reading
Light Source	LED @ 470 nm
Light Detector	silicon photodiode
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	1 x 9V
Auto-Off	after 5 minutes of inactivity
Dimensions	160 x 80 x 41 mm (6.3 x 3.1 x 1.6")
Weight	300 g (10.6 oz)
Waterproof	IP67 rating (HI753 Photometer only, not reagents)
Ordering Information	HI753 Chloride Photometer with cuvette cleaning cloth, user's manual and 25 mL graduated cylinder (2) 10 mL graduated cylinders and (2) pipettes, 25 mL beaker, 5 mL syringe, 5 mm adapter, screwdriver and carrying case
Reagent Set*	HI753-25 (25 tests)
Calibration Set	HI753-11

*Recharge kit includes reagents, calibration solution and instructions

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Photometers

Free Chlorine and Ultra Low Range Free Chlorine

Handheld Colorimeter





Total, Total Ultra Low Range and Ultra High Range Chlorine

Handheld Colorimeters

- Easy to use and rapid, accurate measurements
- Designed to analyze a specific parameter
- Small, sturdy and waterproof
- Ideal for:
  - Swimming pool and spas
  - Fruit and vegetable sanitization
  - Drinking water
  - Quality control checks
  - Environmental
  - Hospitality
  - Food processing

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

The HI713, HI758 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 rely on the subjective interpretation of a color change, while professional instrumentation can cost hundreds of dollars and can be time consuming to operate and maintain. Hanna's Checker HC's are accurate and affordable alternatives.

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

These Checker HC's are designed to be portable and sturdy for use in testing quick, accurate results in the everyday setting.

Type/Parameter	HI713 (Total)	HI758 (Total ULR)	HI771 (Total UHR)
Range	0.00 to 5.00 ppm	0.00 to 5.00 ppm	0.0 to 10.0 ppm
Resolution	0.01 ppm	0.01 ppm	0.1 ppm
Accuracy @ 25°C (77°F)	±0.04 ppm ±3% of reading	±0.04 ppm ±3% of reading	±0.4 ppm ±3% of reading
Light Source	LED at 525 nm		
Light Detector	silicon photodiode		
Measurement	Chlorine (CL2) is oxidized by the reagent and forms a pink color proportional to the chlorine concentration		
Battery Type	1.5V AAA		
Auto-off	after 3 minutes of inactivity	after 5 minutes of inactivity	
Dimensions	160 x 68 x 37 mm (6.3 x 2.7 x 1.5")		
Weight	140 g (4.9 oz)		
Method	adapted from USEPA method 330.5 and Standard Methods 4500-Cl G		adapted from Standard Methods 4500-Cl G
Ordering Information	HI713 Checker HC® colorimeter with reagents, cuvettes with caps (2), instruction manual in storage/carrying case with lanyard and CR2032 battery		
	HI758 Checker HC® colorimeter with reagents, cuvettes with caps (2), instruction manual in storage/carrying case with lanyard and CR2032 battery		
	HI771 Checker HC® colorimeter with reagents, cuvettes with caps (2), instruction manual in storage/carrying case with lanyard and CR2032 battery		
Reagent Set	HI713-25 (25 tests)	HI758-25 (25 tests)	HI771-25 (25 tests)
Calibration Set	HI713-11	HI758-11	HI771-11

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Photometers

Checker HC

Chromium VI Low Range and High Range

Handheld Colorimeters





Color of Water

Handheld Colorimeter

- Easy to use and meets accurate true color measurements
- Conforms to existing parameter
- Small size, big convenience
- Ideal for water quality

Specifications	
Range	
Resolution	
Accuracy @ 25°C/77°F	
Light Source	
Light Detector	
Display Type	
Auto-off	
Dimensions	
Weight	
Method	
Shipping Information	
Calibration Test	

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Photometers

Maple Syrup Digital Grader

Handheld Colorimeter





Copper Low Range and High Range

Handheld Colorimeters

- Easy to use and fast to conduct tests
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Water Quality
  - Education
  - Aquarium
  - Wastewater
  - Environmental

The HI707 and HI747 Checker HC® are simple, accurate, and cost effective way to measure high and low ranges of copper. Designed as a result of close interaction with chemists in the field, the HI707 and HI747 provide quick, accurate results in four easy steps.

Step One - Add a sample to the Checker HC and press button to zero.

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

Step Three - Remove sample and add reagent packet.

Step Four - Remove sample, press and hold the button for 2 seconds to start countdown timer. Reading will be taken automatically and the results displayed.

The HI707 and HI747 uses an adaptation of the EPA method. The only test to measure copper and the bicinchoninate reagent causes a purple tint in the sample.

Specifications	HI 707 (LR)	HI 747 (HR)
Range	0 to 5.00 ppb	0.00 to 6.00 ppm
Resolution	1 ppb	0.01 ppm
Accuracy @ 25°C (77°F)	± 100 ppb ± 5% of reading	± 0.05 ppm ± 5% of reading
Light Source	LED @ 575nm	
Light Detector	silicon photodiode	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 3V CR2032	
Auto-Off	after 10 minutes of non-use	
Dimensions	86 x 74 x 32 mm (3.4 x 2.9 x 1.3")	
Weight	90g (3.2 oz)	
Method	colorimetric 1 mL (0.034 fl oz) test. The reagent converts copper ions in the sample to a purple color in the sample.	
Ordering Information	HI747 Checker HC® for copper with reagents (25 tests) and cuvettes (2) HI707 Checker HC® for copper with reagents (25 tests) and cuvettes (2)	
Reagent Set	HI707-25 (25 tests)	HI758-25 (25 tests)
Cuvette (clear) Set	HI707-11	HI758-11

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Photometers

Fluoride Low Range and High Range

Handheld Colorimeters





Magnesium and Calcium Hardness

Handheld Colorimeters

- Easiest to use and most accurate titration method
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Water purification systems
  - Heating and cooling systems
  - Brewing water
  - Aquaculture

The HI753 Checker®HC is a simple, accurate and cost effective way to measure magnesium hardness. The HI755 Checker HC is a simple, accurate and cost effective way to measure calcium hardness.

The HI753 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, 3500-Mg colorimetric method. The reaction between magnesium and reagents causes a reddish-violet tint in the sample.

The HI755 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Calmagite method. The reaction between calcium and reagents causes a reddish-violet tint in the sample.

Specifications	HI753 (Magnesium Hardness)	HI755 (Calcium Hardness)
Range		
Resolution		
Accuracy @25°C/77°F		
Light Source		
Light Detector		
Environment		
Battery Type		
Auto-off		
Dimensions		
Weight		
Method		
Ordering Information		
Reagent Set		
Calibration Set		

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Photometers

Iodine

Handheld Colorimeter





Iron Low Range and High Range

Handheld Colorimeters

- [illegible]
- [illegible]
- [illegible]
- [illegible]
  - Industrial ground and treated waters
  - Mining washers monitoring
  - Agricultural irrigation waters

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

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Photometers

Checkers®HC

Manganese High Range

Handheld Colorimeter

- Designed to quickly and accurately measure manganese concentrations
- Easy-to-read, fully waterproof display
- Simple, one-touch operation
- Ideal for use in:
  - Water Quality
  - Education
  - Aquarium
  - and Aquaculture
  - Environmental

The HI729 Checker HC® is a simple, accurate, and cost-effective way to measure high ranges of manganese. Designed as a more economic alternative to chemical titrations, the HI729 provides quick, accurate results in four easy steps.

Step One - Add a sample to the included cuvettes.

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

Step Three - Remove sample and add reagent.

Step Four - Reinsert sample, press and hold the button for 3 seconds to start read interval. Reading will be taken automatically and the results displayed.

The HI 729 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 20th edition, Periodate method. The reaction between manganese and reagents causes a color shift in the sample.



Specifications	HI729 Manganese (HR)
Range	
Resolution	
Accuracy @ 25°C (77°F)	
Light Source	
Light Detector	
Enclosure	
Battery Type	
Auto-Off	
Dimensions	
Weight	
Method	
Ordering Information	
Reagent Set	
Calibration Set	



Nickel High Range

Handheld Colorimeter

- Easy to use and ideal for on-the-field measurements
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for
  - Spot checks in tubing
  - Use in testing or production processes

Nickel is a heavy metal found in natural waters, but in a form present in industrial environments as a direct by-product of manufacturing items, and as a corrosion by-product of stainless steel, nickel or nickel alloys.

The most serious effects of nickel exposure include lung cancer and nasal cancer in people who have breathed too much nickel while working in nickel refineries or in metal processing plants. Other lung effects including chronic bronchitis and reduced lung function have been observed in workers breathing nickel. The levels of nickel in the world's seas are much higher than background levels. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

The HI729 Checker®HC colorimeter ranges 0 to 10 g/L (ppt) and is supplied complete with user-replaceable lamp, and the reagents needed for 25 tests. Just pour the solution into the Checker HC, press the button for 3 seconds. The display will show the concentration in g/L (ppt) of nickel. It's that easy.

Specifications	HI729 (HR)
Range	0.00 to 10.00 g/L
Resolution	0.01 g/L
Accuracy @ 25°C (77°F)	±0.08 g/L after blanking
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) 9V
Auto-Off	after 10 minutes of inactivity
Dimensions	160 x 80 x 40 mm (6.3 x 3.1 x 1.6")
Weight	310 g (11 oz)
Waterproof	IP67 (floats)
Ordering Information	HI729 Checker®HC is supplied with sample cuvettes (pair), (2) 10 ml reagent vials for 25 reagents, Quick Start Guide and 9V battery.
Reagent Set	HI729-25 (25 tests)
Calibration Set	HI729-11

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Photometers

Nitrite Low Range, High Range and Marine Nitrite Ultra Low Range

Handheld Colorimeters





Phosphate

Handheld Colorimeters

- Easy to use and ready to analyze when powered on
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Aquaculture
  - Natural, potable, agricultural and drinking waters

Orthophosphates are found in natural waters and wastewaters. They are commonly added to drinking water as a corrosion inhibitor. The most common analysis of orthophosphates is by colorimetric determination provided reproducible results using a standard analysis technique.

The Checker HC® and HI717 Checker HC® bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are relatively accurate and offer only basic portability, while professional instrumentation can cost hundreds of dollars and can be time-consuming to calibrate and maintain. The Checker HC® and HI717 Checker HC® are accurate and affordable.

The HI713 Checker HC® is a rugged handheld colorimeter featuring a resolution of 0.01 ppm and 40 user cells of reading accuracy. The HI713 Checker HC® uses an adaptation of the standard test method.

The HI717 Checker HC® is a rugged handheld colorimeter featuring a resolution of 0.1 ppm and 10 user cells of reading accuracy. The HI717 Checker HC® uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 19th edition, 4500-P E method.

Specifications	HI713 (0.01)	HI717 (0.1)
Range	0.00 to 2.50 ppm	0.0 to 30.0 ppm
Resolution	0.01 ppm	0.1 ppm
Accuracy @ 25°C/77°F	±0.04 ppm ±3% of reading	±0.3 ppm ±3% of reading
Light Source	525nm LED	
Light Detector	photodiode	
Measurement	mg/L (ppm)	
Battery Type	3 x 1.5V AAA	
Auto-off	5 minutes after last key use	60 minutes after last key use
Dimensions	85.5x65.5x34mm (3.4x2.6x1.3")	
Weight	140g (4.9oz)	
Method	adaptation of the Molybdenum Blue method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 19th edition, 4500-P E method
Reagents Information	HI713-25 Checker HC® supplied with 1 sample cell and 1 cap (5 samples per reagent kit) for a total of 25 tests; battery and instruction sheet supplied HI717-25 Checker HC® supplied with 1 sample cell and 1 cap (5 samples per reagent kit) for a total of 25 tests; battery and instruction sheet supplied
Reagent Set	HI713-25 (25 tests)	HI717-25 (25 tests)
Calibration Set	HI713-11	HI717-11

Specifications are subject to change without notice or obligation.

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Photometers

Checker HC

Phosphorus

Handheld Colorimeters





Silica High Range and Low Range

Handheld Colorimeter

- Ideal for:
  - Aquaculture, water quality
  - Environmental water treatment

SPECIFICATIONS	HI713 (HR)	HI713 (LR)
Range		
Resolution		
Accuracy @ 25°C/77°F		
Light Source		
Light Detector		
Wavelength		
Battery Type		
Auto-off		
Dimensions		
Weight		
Method		
ORDERING INFORMATION		
Reagent Set		
Calibration Set		

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Photometers

Checker® HC

Checker®HC Reagents and Calibration Check Sets

Model Code	Parameter	Chemical Method	Reagent Code	Calibration Checking Set	# of Tests
HI701	[illegible]	[illegible]	HI700-25	HI700-11	25
HI705	[illegible]	[illegible]	HI705-25	HI705-11	25
HI707	[illegible]	[illegible]	HI707-25	HI707-11	25
HI708	[illegible]	[illegible]	HI708-25	HI708-11	25
HI709	[illegible]	[illegible]	HI709-25	HI709-11	25
HI711	[illegible]	[illegible]	HI711-25	HI711-11	25
HI713	[illegible]	[illegible]	HI713-25	HI713-11	25
HI715	[illegible]	[illegible]	HI715-25	HI715-11	25
HI716	[illegible]	[illegible]	HI716-25	HI716-11	25
HI717	[illegible]	[illegible]	HI717-25	HI717-11	25
HI718	[illegible]	[illegible]	HI718-25	HI718-11	25
HI719	[illegible]	[illegible]	HI719-25	HI719-11	25
HI720	[illegible]	[illegible]	HI720-25	HI720-11	25
HI721	[illegible]	[illegible]	HI721-25	HI721-11	25
HI722	[illegible]	[illegible]	HI722-25	HI722-11	25
HI723	[illegible]	[illegible]	HI723-25	HI723-11	25
HI726	[illegible]	[illegible]	HI726-25	HI726-11	25
HI727	[illegible]	[illegible]	-	HI727-11	-
HI728	[illegible]	[illegible]	HI728-25	HI728-11	25
HI731	[illegible]	[illegible]	HI731-25	HI731-11	25
HI732	[illegible]	[illegible]	HI732-25	HI732-11	25
HI733	[illegible]	[illegible]	HI733-25	HI733-11	25
HI734	[illegible]	[illegible]	HI734-25	HI734-11	25
HI735	[illegible]	[illegible]	HI735-25	HI735-11	25
HI736	[illegible]	[illegible]	HI736-25	HI736-11	25
HI737	[illegible]	[illegible]	HI737-25	HI737-11	25
HI738	[illegible]	[illegible]	HI738-25	HI738-11	25
HI739	[illegible]	[illegible]	HI739-25	HI739-11	25
HI740	[illegible]	[illegible]	HI740-25	HI740-11	25
HI741	[illegible]	[illegible]	HI741-25	HI741-11	25
HI742	[illegible]	[illegible]	HI742-25	HI742-11	25
HI743	[illegible]	[illegible]	HI743-25	HI743-11	25
HI744	[illegible]	[illegible]	HI744-25	HI744-11	25
HI745	[illegible]	[illegible]	HI745-25	HI745-11	25
HI746	[illegible]	[illegible]	HI746-25	HI746-11	25
HI747	[illegible]	[illegible]	HI747-25	HI747-11	25
HI748	[illegible]	[illegible]	HI748-25	HI748-11	25
HI749	[illegible]	[illegible]	HI749-25	HI749-11	25
HI750	[illegible]	[illegible]	HI750-25	HI750-11	25
HI751	[illegible]	[illegible]	HI751-25	HI751-11	25
HI752	[illegible]	[illegible]	HI752-25	HI752-11	25
HI753	[illegible]	[illegible]	HI753-25	HI753-11	25
HI754	[illegible]	[illegible]	HI754-25	HI754-11	25
HI755	[illegible]	[illegible]	HI755-25	HI755-11	25
HI756	[illegible]	[illegible]	HI756-25	HI756-11	25
HI757	[illegible]	[illegible]	HI757-25	HI757-11	25
HI758	[illegible]	[illegible]	HI758-25	HI758-11	25
HI759	[illegible]	[illegible]	HI759-25	HI759-11	25
HI760	[illegible]	[illegible]	HI760-25	HI760-11	25
HI761	[illegible]	[illegible]	HI761-25	HI761-11	25
HI762	[illegible]	[illegible]	HI762-25	HI762-11	25
HI763	[illegible]	[illegible]	HI763-25	HI763-11	25
HI764	[illegible]	[illegible]	HI764-25	HI764-11	25
HI765	[illegible]	[illegible]	HI765-25	HI765-11	25
HI766	[illegible]	[illegible]	HI766-25	HI766-11	25
HI767	[illegible]	[illegible]	HI767-25	HI767-11	25
HI768	[illegible]	[illegible]	HI768-25	HI768-11	25
HI769	[illegible]	[illegible]	HI769-25	HI769-11	25
HI770	[illegible]	[illegible]	HI770-25	HI770-11	25

Checker HC Accessories

Code	Description
HI731318	[illegible]
HI731321	[illegible]
HI731331	[illegible]
HI731351-50	[illegible]
HI740210	[illegible]
HI740211P	[illegible]
HI740211W	[illegible]
HI740510	[illegible]
HI740510P	[illegible]
HI764509	[illegible]
HI764536	[illegible]

Tips for an accurate measurement



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Chemical Oxygen Demand

introduction



Oxygen Demand and COD

COD Testing Applications

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Beyond COD: Nitrogen and Phosphorus

Nitrogen

Nitrification

Denitrification

Phosphorus





COD Meter and Multiparameter Photometer



COD Laboratory Photometer



COD Test Tube Heater with 25 Vial Capacity

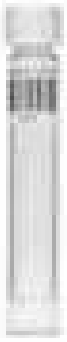
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Chemical Oxygen Demand

COD Meter and Multiparameter Photometer

with Barcode Recognition of Sample Vials







COD Test	Range	Resolution	Accuracy	Method	Reagent Code
COD/LR	0 to 150 mg/L as O2 0 to 300 mg/L 0 to 1500 mg/L	1 mg/L 1 mg/L 10 mg/L	±3 mg/L at +25 °C (+77 °F) reading** ±5 mg/L at +25 °C (+77 °F) reading** ±10 mg/L at +25 °C (+77 °F) reading**	colorimetric 420 nm colorimetric vs. blank** colorimetric**	HI93754B-25 (25 tests) HI93754C-25 (25 tests) HI93754A-25 (25 tests)
COD/HR	0 to 1500 mg/L as O2 0 to 3000 mg/L 0 to 15000 mg/L	1 mg/L 1 mg/L 10 mg/L	±2.5 mg/L at +25 °C (+77 °F) reading** ±3.5 mg/L at +25 °C (+77 °F) reading** ±10 mg/L at +25 °C (+77 °F) reading**	colorimetric 620 nm colorimetric vs. blank** colorimetric**	HI93754B-25 (25 tests) HI93754C-25 (25 tests) HI93754A-25 (25 tests)
COD/HR	0 to 15000 mg/L as O2	10 mg/L	±250 mg/L at +25 °C (+77 °F) reading**	colorimetric**	HI93754A-25 (25 tests)

Test	Range	Resolution	Accuracy*	Method	Reagent Code
Ammonia LR	0.00 to 3.00 mg/L (as NH3, N) 0.00 to 3.89 mg/L (as NH4+)	0.01 mg/L	±0.04 mg/L at +25 °C (+77 °F) reading**	Nessler	HI93733-03 (25 tests)
Ammonia MR	0.0 to 30.0 mg/L (as NH3, N) 0.0 to 38.9 mg/L (as NH4+)	0.1 mg/L	±0.4 mg/L at +25 °C (+77 °F) reading**	Nessler	HI93733-01 (100 tests)
Chlorine, Free**	0.00 to 5.00 mg/L	0.01 mg/L (readings 0.00 to 3.50 mg/L) 0.1 mg/L (readings 3.50 to 5.00 mg/L)	±0.03 mg/L at +25 °C (+77 °F) reading** ±0.15 mg/L at +25 °C (+77 °F) reading**	DPD	HI93701-01 (100 tests) HI93701-03 (300 tests)
Chlorine, Total**	0.00 to 5.00 mg/L	0.01 mg/L (readings 0.00 to 3.50 mg/L) 0.1 mg/L (readings 3.50 to 5.00 mg/L)	±0.03 mg/L at +25 °C (+77 °F) reading** ±0.15 mg/L at +25 °C (+77 °F) reading**	DPD	HI93711-01 (100 tests) HI93711-03 (300 tests)
Chloride	0.0 to 150.0 mg/L (as NaCl, N)	0.1 mg/L	±2.0 mg/L at +25 °C (+77 °F) reading** (pdf)	chromatropic acid	HI93753-01 (50 tests)
Hydrogen Peroxide	0.0 to 10.0 mg/L (as H2O2)	0.1 mg/L	±0.2 mg/L at +25 °C (+77 °F) reading** (pdf)	chromotropic acid	HI93738-01 (50 tests)
Hydrogen Peroxide	10 to 100 mg/L (as H2O2)	1 mg/L	±2 mg/L at +25 °C (+77 °F) reading**	chromotropic acid	HI93738-03 (50 tests)
Phosphorus (Acid Hydrolyzable)	0.00 to 1.60 mg/L (as P)	0.01 mg/L	±0.03 mg/L at +25 °C (+77 °F) reading**	ascorbic acid	HI93706-01 (50 tests)
Phosphorus, Reactive	0.00 to 1.60 mg/L (as P)	0.01 mg/L	±0.03 mg/L at +25 °C (+77 °F) reading**	ascorbic acid	HI93706-02 (50 tests)
Phosphorus, Reactive (PO)	0.0 to 32.6 mg/L (as P)	0.1 mg/L	±0.3 mg/L at +25 °C (+77 °F) reading**	ascorbic acid	HI93717-01 (50 tests)
Phosphorus, Total	0.00 to 1.60 mg/L (as P)	0.01 mg/L	±0.03 mg/L at +25 °C (+77 °F) reading**	ascorbic acid	HI93706-03 (50 tests)
Phosphorus, Total HR	0.0 to 32.6 mg/L (as P)	0.1 mg/L	±0.3 mg/L at +25 °C (+77 °F) reading**	ascorbic acid	HI93717-03 (50 tests)





For safety, the optional HI76037 safety stand and HI740126 test tube rack for the HI839800 are strongly recommended.

Some analytical methods require digestion of the sample. For digestion of the vials, use the Hanna HI839800 reactor only.

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Chemical Oxygen Demand

COD Meter and Multiparameter Photometer



One of the most versatile photometers in the market

COD Test	Range	Method	Reagent Code

Water Quality Test	Range	Method	Reagent Code

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Chemical Oxygen Demand

COD Meter and Multiparameter Photometer

for Wastewater Analysis



COD Certified Reagents



Certified COD Reagents

COD Test	Range	Method	Reagent Code
COD			
COD			
COD			





11

Chemical Oxygen Demand

COD Test Tube Heater

with 25 Vial Capacity



Outer casing stays cool to the touch!





For safety, the optional safety shield and test tube cooling rack for the HI839800 are strongly recommended.

Temperature Range	
Resolution	
Capacity	
Timer	
Power Supply	
Dimensions	
Weight	

12

Turbidity

Titration Solutions

13

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Introduction to Turbidity

Turbidity

Turbidity of water is an optical property that causes light to be scattered and absorbed, rather than transmitted. The scattering of light that passes through a liquid is primarily caused by suspended solids. The higher the turbidity, the greater the amount of scattered light. Even a very pure fluid will exhibit some light scattering as molecules will have some turbidity.

There are different measurement standards used based on applications, and each metric is expressed in specific units. The ISO standard employs the FNU (Formazin Nephelometric Unit) while the EPA uses the FTU (Formazin Turbidity Unit). Other units include the JTU (Jackson Turbidity Unit), FTU (Formazin Turbidity Unit), EBC (European Brewery Convention Turbidity Unit) and silica/diatomaceous earth (mg/L SiO$_2$).

	JTU	FTU/NTU/FNU	SiO_2 (mg/L)
JTU	1	39	20
FTU/NTU/FNU	0.026	1	0.5
SiO_2 (mg/L)	0.4	19	1

Monitoring for Natural Water Supplies

In natural water, turbidity measurements are taken to gauge general water quality and its compatibility in applications where there are aquatic organisms. It has been found that there is a strong correlation between turbidity and BOD (Biochemical Oxygen Demand) values. However, by definition, turbidity obstructs light, thus reducing the growth of marine plants, eggs and larvae, which are usually found in the lower levels of an aquatic ecosystem.



Wastewater Treatment and Turbidity

Historically, turbidity is one of the main parameters monitored in wastewater. In fact, the monitoring and treatment process was once solely based on the removal of turbidity. Currently, the measurement of turbidity at the end of the wastewater treatment process is necessary to verify that the values are within regulatory standards. Generally speaking, the turbidity value has to be between 0 and 50 FTU, with an accuracy of ±5 FTU. Depending on the choice of the wastewater treatment process, by monitoring the turbidity level, it can be determined if the different stages of the process can be used or if the filtration and purification stages have been completed correctly.

The Hanna Solution

There are three analytical wavelength methods for turbidity:

- ISO 7027 "Water Quality. Determination of Turbidity"
- USEPA Method No. 180.1 "Turbidity"
- Standard Method No. 2130 "Turbidity"

Specific wavelength ranges are recommended for each method. For the USEPA and Standard Methods, the wavelength in the visible range of the spectrum is recommended, where the European ISO method requires an infrared light source.

The Infrared Method (ISO 7027)

The ISO 7027 standard specifies the key parameters for the optical system to measure turbidity for drinking and surface waters using this formazin-based metric method. The HI98703 portable turbidimeter meets or exceeds all criteria specified by the ISO 7027 standard.

ISO turbidity meters operate by passing a beam of infrared light through a vial containing the sample to be tested. The light source is a high-precision infrared LED. A sensor positioned at 90° with respect to the direction of the light detects the amount of light scattered by the undissolved particles present in the sample. A microprocessor converts these readings into FNU/FTE values.



The US Environmental Protection Agency Approved Method (180.1)

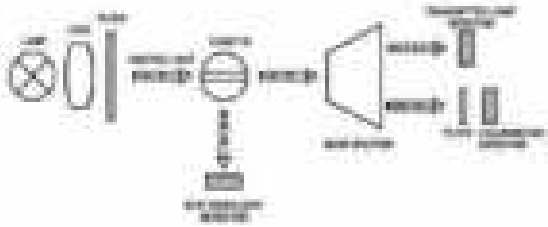
The USEPA Method 180.1 specifies the key parameters for the optical system to measure turbidity for drinking, surface and surface waters in the 0 to 40 NTU range, using the nephelometric method.

Hanna's compliance with EPA approved methods are designed to meet or exceed the criteria specified by the USEPA Method 180.1 and Standard Method 2130 B.

Principle of Operation

The light beam that passes through the sample is scattered in all directions. The intensity and pattern of the scattered light is affected by many variables, such as wavelength of the incident light, particle size and shape, refractive index, and color. The optical system includes a tungsten filament lamp as the light source and a scattered light detector (90°), and an unscattered light detector (180°).

Introduction to Turbidity



Standardization

Formazin

AMCO AEPA-1 Standard

Purification of Drinking Water



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Turbidity

Introduction to Turbidity

Adequately treated surface water does not usually present a turbidity problem. The World Health Organization has placed 5.0 as the reference turbidity value of water for drinks. This value has been established based on the ability to visually perceive it as water. From a hygienic point of view, 1 NTU is the recommended value. Many drinking water utilities strive to achieve levels as low as 0.1 NTU.

Turbidity is an indicator and will not give results for a specific pollutant. It will, however, provide information on the degree of water contamination. The flow chart for the water treatment process of drinking water shows the turbidity reference values for each phase.

Typical sources of turbidity in drinking water include the following:

- Waste drainage
- Run-off from watersheds, especially those that are disturbed by building
- Algae or aquatic weeds and products of their breakdown in water reservoirs, rivers or lakes
- Humic acid and other organic compounds resulting from breakdown of plants, leaves, etc. in water sources
- High concentrations of iron and manganese in both groundwater and surface water (mainly in groundwater and groundwater under the direct influence of surface water)
- Air bubbles and particles from the treatment process





EPA Compliant Meters

ISO Compliant Meters

Application Specific Meters

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Turbidity

Turbidity and Free/ Total Chlorine Meter

EPA Compliant



- GLP Data
  - The HI 83414 Photometer complies GLP (Good Laboratory Practice) functions that allow traceability of the calibration conditions. Data includes calibration points, date, and time.
- Data Logging
  - Up to 200 measurements can be stored in the internal memory and recalled at any time.
- Data Transfer
  - The Multi-parameter analysis data is logged to a can be downloaded to a Windows compatible PC using the USB port of the HI 83300 software.
- Timed Mode
  - The unique function to create provides additional information to help the user during measurements, where a colored line and a pulsed display explain when and when to take a pre-condition or other operations to be performed.
- Connectivity
  - Connectivity to a PC is always available through a dedicated USB port.
- Backlit Graphic LCD Display
  - A graphic LCD display provides an easy to understand, user friendly interface. All messages are in plain text making them easy to read.

HI83414 Turbidity Specifications

Turbidity Multi-Range	Range	
	Resolution	
Alkalinity Titration	Range	
	Resolution	
Range Selection		automatic
Accuracy		
Resolution		
Temperature		
Light Source		
Light Detector		
Method		
Measuring Mode		
Turbidity Stability		
Calibration		

HI83414 Free and Total Chlorine Specifications

Range	
Resolution	
Accuracy @25°C/77°F	
Sample Size	
Reagent	
Standards	
Calibration	

HI83414 General Specifications

Light Source Life	
Display	
Data Memory	
Connectivity	USB
Environment	
Power Supply	
Dimensions	
Weight	
Ordering Information	

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Turbidity

EPA Methods

Precision Turbidity Benchtop Meter

EPA Compliant





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Turbidity

EPA Methods

Turbidity and Free/ Total Chlorine Portable Meter

Fast Tracker® Technology EPA Compliant





FastTracker®



FastTracker™



iButton® Tags are Easy to Install



12

Turbidity

EPA Methods

Turbidity Meter

Fast Trakker™ Technology, EPA Compliant





FastTracker®



Fast Tracker™



iButton® Tags are Easy to Install



12

Turbidity

Field Meters

Meter for Water Analysis

Turbidity, Cl_2, pH, Bl, Fe, I and CYAC





Specifications			
		Turbidity	Bl - Bromine
	Range		
	Resolution		
	Accuracy @25°C		
		Free and Total Chlorine	CYAC - Cyanuric Acid
	Range		
	Resolution		
Photometer Specifications	Accuracy @25°C		
		I - Iodine	Fe/LR - Iron/LR
	Range		
	Resolution		
	Accuracy @25°C		
		pH	
	Range		
	Resolution		
	Accuracy @25°C		
Additional Specifications	Turbidity Calibration		
	Light Source / Detector		
	Power Type / Life		
	Dimensions		
	Shipping Weight		
Ordering Information			



Turbidity Meter

with Fast Tracker™ technology ISO

- Fast Tracker™ Technology
- ISO Compliant
- Calibration
- Data Logging
- Easy Transfer
- Rugged Design

12

Turbidity

Turbidity Benchtop Meter

ISO Compliant





12

Turbidity

Turbidity Meter

ISO Compliant







Fast Tracker®

Portable Turbidity Meter

and Bentonite Monitoring

- Ruggedness
  - Meets Good Laboratory Practices
- Backlight
  - Bluish LED
- Connectivity
  - PC interface via USB

Fast Tracker™



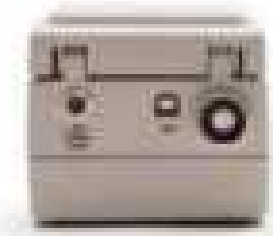
12

Turbidity

Haze Meter

for Beer Quality Analysis







Why this instrument is so important...

Methods

Store Model Table



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Standards and Accessories

Turbidity

Calibrants and Accessories

HI88414 Standards and Accessories

Reagent Code	Description
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Accessory Code	Description
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
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[illegible]	[illegible]

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HI93414 Standards and Accessories

Reagent Code	Description
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[illegible]	[illegible]

Accessory Code	Description
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[illegible]	[illegible]

[illegible]

HI88703 Standards and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
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HI98703 Standards and Accessories

Reagent Code	Description
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Accessory Code	Description
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[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

Standards and Accessories

HI93102 Solutions and Accessories

Reagent Code	Description
HI93102-0	[illegible]
HI93102-50	[illegible]
HI93703-01	[illegible]
HI93703-03	[illegible]
HI93713-00	[illegible]
HI93713-01	[illegible]
HI93713-02	[illegible]
HI93713-03	[illegible]
HI93713-04	[illegible]
HI93713-50	[illegible]
HI93703-01	[illegible]
HI93703-03	[illegible]
HI93703-04	[illegible]
HI93703-50	[illegible]

Accessory Code	Description
HI889000	[illegible]
HI93703-50	[illegible]
HI710100	[illegible]
HI76302	[illegible]

HI93713 Standards and Accessories

Reagent Code	Description
HI93713-11	[illegible]

Accessory Code	Description
HI889000	[illegible]
HI93703-50	[illegible]
HI711210	[illegible]
HI710100	[illegible]
HI710300	[illegible]
HI92000	[illegible]
HI92000-0	[illegible]
HI76302	[illegible]

HI93713 Standards and Accessories

Reagent Code	Description
HI93713-11	[illegible]

Accessory Code	Description
HI889000	[illegible]
HI93703-50	[illegible]
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HI710300	[illegible]
HI711210	[illegible]
HI711211	[illegible]
HI711300	[illegible]
HI92000	[illegible]
HI92000-0	[illegible]
HI76302	[illegible]

HI93703 Standards and Accessories

Reagent Code	Description
HI93703-0	[illegible]
HI93703-50	[illegible]
HI93703-10	[illegible]

Accessory Code	Description
HI710211	[illegible]
HI93703-50	[illegible]
HI889000	[illegible]
HI711210	[illegible]
HI710211	[illegible]

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Standards and Accessories

Turbidity

Calibrants and Accessories

HI93749 Standards and Accessories

Reagent Code	Description
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[illegible]	[illegible]

Accessory Code	Description
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[illegible]

HI93703 Standards and Accessories

Reagent Code	Description
[illegible]	[illegible]

Accessory Code	Description
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Propylene Glycol 13.8

Refractive Index







Hanna Digital Refractometers





Digital Refractometers

for Measurement of Sugar in Wine



- Dual level LED
  - Dual level LED display to read measurement and temperature readings simultaneously
- ATC
  - Automatic Temperature Compensation
- Alerts
  - Alert to the user of low battery power that could adversely affect readings
- IP65 water protection
  - Built to withstand rugged environments and harsh conditions
- Quick, accurate results
  - Readings are displayed in approximately 1.5 seconds
- One point calibration
  - Calibrate with distilled or deionized water
- Small sample size
  - Sample size is small as 2 drops (0.4mL)
- Automatic shut off
  - After 3 minutes of non-use
- Convenient sample well
  - Easy to clean and resistant to moisture
- Easy measurement
  - Place a few drops of the sample in the well and press the READ key
- Light weight and handy

WINE line

Five Instruments for Wine Analysis

Hanna offers five wine refractometers to meet the various requirements throughout the wine industry. The HI96801, HI96811, HI96812, HI96814 and HI96849 Digital Wine Refractometers are rugged, lightweight and waterproof for measurements in the lab or field.

Refractive Index

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

The dry bulk measurement of the refractive index makes a simple and rapid instrument to provide the wine industry an accurate method for sugar content analysis. Samples are measured after a simple water dilution and with a pre-calibrated or distilled water calibration as well, the instrument measures the refractive index of the grape must. These digital refractometers correlate the value directly associated with mechanical refractometers and are ideal for fast, reliable measurements.

Instrument Descriptions

HI96811, **HI96813** and **HI96814** convert the refractive index of the sample to sucrose concentration in units of percent by weight. Refractometers read in °Brix. The conversion used is based on the ICUMSA Method (International Commission for Uniform Methods of Sugar Analysis). Since the majority of sugar in grapes is fructose and glucose and not sucrose, the readings are referred to as "Apparent Brix".

HI96812 has units of °Baumé. The °Baumé scale is based on density and was originally designed to measure the mass of sodium chloride in water. °Baumé is used in winemaking to measure the sugar in must. The HI96812 converts the °Be reading to °Baumé based on the table found in the Official Methods of Analysis of AOAC International, 18th Edition. One °Baumé is approximately equal to 1.8 °Brix and 2 °Baumé is roughly equivalent to 1% alcohol when the wine is fully fermented.

In addition to Brix, **HI96814** includes automatic room, read in the wine industry °Brix/Oe and °Öchsle.

°Oechsle (°Oe) is mainly used in the German, Swiss and Luxembourg wine-making industry to measure the sugar content of must. The °Oe scale is based on specific gravity at 20°C (°SG-20/20) and is the first 3 digits following the decimal point. One °Oe is roughly equal to 0.2 °Brix.



Digital Refractometers

for Sugar Analysis Throughout the Food Industry



Five Instruments for Sugar Analysis

Refractive Index

Features

5 Digital Refractometers for Sugar Analysis to Choose from

Making a Standard % (t/t) Solution

Specifications						
Sugar Content	Range					
	Resolution					
	Accuracy					
Temperature	Range					
	Resolution					
	Accuracy					
Interface Specifications	Sample Size					
	Measurement Time					
	Minimum Sample Volume					
	Light Source					
	Sample Cell					
	Power					
	Battery Type					
	Dimensions					
Ordering Information						

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Refractometers

Digital Refractometer

for Sodium Chloride Measurement Throughout the Food Industry



Ideal for the Food Industry

Refractive Index

Features

Easy to Operate

Start-up Screens

Unit Selection

Calibration

Measurement

Making a Standard Sodium Chloride Solution

Specifications		

Digital Refractometer

for Natural or Artificial Seawater Analysis



- Designed for seawater salinity analysis
- High accuracy measurements displayed in PSU, ppt and specific gravity
- Dual-level LCD
  - The dual-level LCD displays measurement and temperature readings simultaneously
- ATC
  - Automatic Temperature Compensation
- Easy measurement
  - Place a few drops of the sample in the well and press the READ key
- Alerts
  - Alerts the user of low battery power that could adversely affect readings
- IP65 water protection
  - Built to perform under the harsh field conditions and resistant with shock elements and sealing materials
- Quick, accurate results
  - Readings are displayed in approximately 3 seconds
- Simple user calibration
  - Calibrate with distilled or deionized water
- Temperature unit
  - Selects the temperature unit as Celsius or Fahrenheit
- Automatic shut-off
  - After three minutes of inactivity
- Waterproof, hard-sample seal
  - Easy to clean and to maintain cleanliness
- ABS fine-molded casing

Ideal for Seawater Analysis

The Importance of Salinity Measurement Throughout a Variety of Applications

Easy to Operate

Start-up Screens

Unit Selection

Calibration

Measurement

Making a Standard Sodium Chloride Solution

Some specific examples of the importance of salinity

13

Refractometers

Digital Refractometers

for Ethylene and Propylene Glycol Analysis



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Thermometers Introduction



About Thermometers

Measurement Unit

Achieving Thermometer Accuracy

Thermometers Introduction

Importance of Accuracy

User Calibration of Typical Thermometers

Hanna CAL Check™ Calibration Feature

Standardization

Thermocouple Thermometer Calibration



Calibration Test Keys

Thermometers Introduction



Thermistor Thermometers

The thermistor is a semiconductor made with the sensitivity of its resistance as a function of temperature (T).

$$R = R_0 \beta \cdot \alpha (T - T_0)$$

where

R = resistance of temp. at T T = temp. (in kelvin) of measurement
R_0 = resistance of temp. at T_0 T_0 = temp. (in kelvin) of the beginning of measurement

Temperature coefficient is the parameter that determines if the sensor is negative (NTC) or positive (PTC). Typically, NTC thermistors have a negative temperature coefficient, while PTC thermistors have a positive temperature coefficient. Thermistors are suitable for a temperature range of -50 to 150°C (-58 to 302°F). Higher temperatures may damage the semiconductor sensor. Accurate temperature measurements are possible (within degrees) due to the high sensitivity of the sensor.

Thermocouple Thermometers

The thermocouple consists of the junction of two wires of different metals. At a given temperature, a potential difference results at the opposite ends of the two wires (known as the Seebeck effect). The magnitude of this potential is related to the metals. It is therefore possible to determine the temperature given the potential difference and characteristics of the two metals. The measurement end of the thermocouple probe is called the hot junction, while the connection of the thermocouple to the meter is the cold junction. An error is introduced as the cold junction is exposed to the ambient temperature. This error can be eliminated by physically putting the cold junction inside an ice bath and forcing a reference temperature of 0°C, or by electronically compensating for the cold junction temperature effect. There are various types of thermocouples, identified by an ANSI code using a letter of the alphabet. The K type is the most commonly used thermocouple.

Pt100 Thermometers

The operating principle of resistance thermometers is based on the increase of electric resistance of metal conductors (RTD: Resistance Temperature Detector) with temperature.

The physical phenomenon was discovered by Sir Humphry Davy in 1821. In 1871, Sir William Siemens described the application of this property by using platinum, thereby introducing an innovation in the manufacturing of temperature sensors. Platinum resistance thermometers have been used as an international standard for measuring temperatures between hydrogen triple point (-259.34°C) and the freezing point of antimony at 630.755°C (1165.359°F).

Among the various metals to be used in the construction of resistive thermometers, platinum (Pt), a noble metal, is the one that can measure the widest range, from a few degrees above absolute zero (-270°C (-454.00°F)) to 850°C (1562°F), with a linear response.

Platinum RTD thermometers were common in the past but have now been replaced with thermistor sensors due to their smaller dimensions and faster response to temperature changes. The most common RTD sensor used worldwide is the Pt100, which means a resistance of 100Ω at 0°C with a temperature coefficient of 0.00385Ω per degree Celsius. For a higher grade one can buy platinum sensors with 0.1, 0.03 or 0.01 DIN class.

The main disadvantage of RTD probes is the existence of the connecting wire. This problem prevents the use of standard two wire cables for lengthy runs. Five wires, also in this case only at the reading, for the location, to obtain high levels of accuracy in industrial and laboratory applications, three wire or four wire system is recommended.

For all Hi Pt100 thermometers and probes, Hanna has chosen the most pure wire technology for higher accuracy.

Infrared Thermometers

All objects emit radiant energy in the infrared (IR) zone but we must first between visible light and radio waves.

The origins of IR measurements can be traced back to Sir Isaac Newton's prism and the separation of sunlight into colors and electromagnetic energy. In 1800, the relative energy of each color was measured, but it was not until early 20th century that IR energy was recognized. It was then discovered that this energy is proportional to the 4th power of the object's temperature.

IR thermometers using this formula first came to exist 50 years. They detect the energy via an optic device that converts the heat energy generated by the object into the sensor. It is then amplified, linearized and converted to an electronic signal which in turn shows the surface temperature in Celsius or Fahrenheit degrees.

Infrared measurements are particularly suitable for areas where it is difficult or undesirable to take surface temperatures using conventional contact sensors. Applications for IR meters include non-destructive testing of machinery, moving machinery, and high temperature materials.

Thermometers Introduction



Reference Temperatures

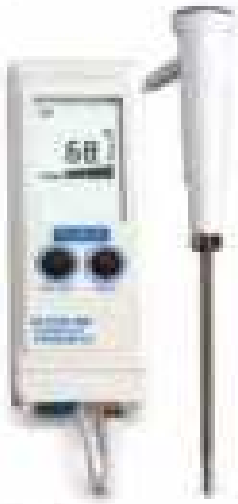


Product Spotlights

K-Type Thermocouple Thermometer with Penetration Probe



Thermistor Thermometer for the Food Industry



Thermistor Thermometer





Thermocouple Thermometers

Thermistor Thermometers

Infrared Thermometers

Pt100 Thermometers

Temperature Dataloggers

14

Temperature

K-Type Thermocouple Thermometers





Dual-channel, K-Type Thermocouple Thermometer

- Multiple input currents
  - Dual input channels
- HOLD
  - HOLD function
- ATC
  - Atomatic compensation of the effects of temperature on readings
- Battery indicator
  - Battery life indicator
- Rugged design
  - Compact, heavy-duty and waterproof

HI 935002 is a dual-channel, waterproof K-Type thermometer that offers accurate temperature measurements in a wide range, as well as 3,000 hours of battery life.

The unit's display can show temperature readings from the sensor and ambient temperature for each channel or the difference between the two channels. The difference between each channel can be shown, or a reference value can be set via the keypad and compared against the measured value.

The HOLD button freezes the display to allow the user time to record readings.

The tester powers on and off automatically (Auto Power On/Off function) when it is removed from the case. In the event of low battery power, a battery icon will appear on the display.

Specifications	HI 935002	
Range	-200.0 to 1372°C (-328 to 2501°F); -200 to 1372°C (-328 to 2501°F) selectable (NIST)	
Temperature	0.1°C (0.1°F) from -199.9 to 199.9°C (-199.9 to 199.9°F) and 1°C (1°F) elsewhere (NIST) selectable	
Accuracy	±0.4% F.S. (for ±1 digit) excluding probe errors	
Probe	HI762 series K-type thermocouple probe included	
Battery Type / Life	1 (9V) alkaline / approx. 3000 hours of continuous use	
Environment	0 to 50°C (32 to 122°F); RH max 100%	
Dimensions	150 x 80 x 31 mm (5.9 x 3.1 x 1.2")	
Weight	170 g (6 oz)	
Ordering Information	HI935002 Dual-channel K-type thermometer with battery and carrying case	
Probes	HI762	Penetration, general purpose, stainless steel, K-type thermocouple probe, 1 m (3.3') cable
	HI766B	Immersion, stainless steel, K-type thermocouple probe, 1 m (3.3') cable
	HI766B1	Penetration, stainless steel tip, stainless steel, K-type thermocouple probe, 1 m (3.3') cable

14

Temperature

0.1° Resolution K-Type Thermocouple Thermometers



Dual-input, K-Type Thermocouple Thermometers



- HI 2210
  - HI 2210 Functions
- Multiple input channels
  - Dual input
- ΔT(°)
  - Δ to the value of the former present that could adversely affect readings
- Battery indicator
  - Battery life indicator at start up
- Alarm on/off
  - Compact, heavy-duty and water-proof
- Backlight
  - Backlit display (4 and 9 versions)
- Connectivity
  - PC and printer compatible (9 versions)

Used to simultaneously measurement of two samples at the same time. The HI 2210 series thermometers feature 2 channels for type K thermocouple connections.

These thermometers display current temperature along with the high and low values in either channel. You can also see the difference between the two channels simultaneously with the high and low of the difference.

The HOLD button freezes the display to allow the user time to record readings.

The HI 2210 has a user selectable backlight for low or bright environments. The CAL button allows the operator to perform a simple zero point calibration at room temperature (25°C) when probes are changed or worn.

The HI 2210 is equipped with a USB port that allows the data transfer to a PC or printer.

The HI 2210 is compatible with GLP (Good Laboratory Practice) systems, which alert the user at the end of the battery life that battery power could adversely affect readings.

Specifications	HI 2210	HI 2210-01
Range	-200.0 to 1999.9°C / -328.0 to 3199.9°F; -200 to 1999°C / -328 to 3199°F	
Resolution	0.1°C (-199.9 to 1999.9°C) / 0.1°F (-199.9 to 999.9°F) / 1°C (-200 to -199.9°C and 1000 to 1999°C) / 1°F (-328 to -199.9°F and 1000 to 3199°F)	
Accuracy	±0.4°C (±0.8°F) from 0 to +70°C (+32 to +158°F) excluding probe error ±0.2°C (±0.4°F) from 0 to +70°C (+32 to +158°F) excluding probe error	
Probe	HI 2210 series of type K thermocouple thermometers*	
CAL Button	N/A	yes
Backlight	N/A	yes
HOLD	N/A	yes
Battery Type / Life	1.5V AAA (3) / user replaceable / 200 hours with no backlight (typical) or 20 hours with backlight (typical) / auto-off after 5 minutes of inactivity (disabled) / auto-off after 20 minutes (disabled)	
Environment	0 to 50°C (32 to 122°F) / RH max 100%	
Dimensions	150 x 80 x 30mm (5.9 x 3.1 x 1.2")	
Weight	170 g (6 oz)	
Ordering Information	HI 2210-0 and HI 2210-01 are supplied with batteries, instruction manual and carrying case.	
Probes*	HI 76402	Stainless steel penetration probe with 1m (3.3') cable
	HI 76403	Temperature/humidity probe with 1m (3.3') cable
	HI 76405	General purpose probe with 1m (3.3') cable

*Temperature probes sold separately, see accessories section.

0.1° Resolution K-Type Thermocouple Thermometers



Heavy-duty K-Type Thermocouple Thermometer



- HOLD
  - HOLD function
- OFF
  - due to the event of low battery power that could adversely affect readings
- Battery indicator
  - Battery life indicator at start-up
- Auto-power off
  - Auto-power off saving

The versatile K-type thermocouple thermometer features easy-to-read, ergonomic controls and displays current temperature along with the high and lowest values achieved during the measuring session on the LCD.

The HOLD button freezes the display to allow the user time to record readings. The "OFF" function switches between the Celsius and Fahrenheit temperature scale. The ⏻ ENTER button returns the reading to high and low temperature values.

The HI 9063 is equipped with BEPS (Battery Error Prevention System), which alerts the user in the event that low battery power could adversely affect readings.

Type/Function	HI 9063
Range	-50.0 to 1200.0°C / -58.0 to 2192.0°F
Temperature	0.1°C (0.1°F) (Resolution 0.1°F (0.1°C) applies -199.9°C to 199.9°C / -199.9°F to 199.9°F)
Accuracy	±(0.4% rdg +1°C) above -100°C; ±(0.4% rdg +2°C) below -100°C
Probe	HI 766063 K-type thermocouple (not included)
Battery Type/Life	1 (9V alkaline) supplied with BEPS (Battery Error Prevention System) / Approx. 200 hours
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	150 x 80 x 40 mm (5.9 x 3.1 x 1.6")
Weight	170 g (6 oz)
Ordering Information	HI 9063 supplied with instruction manual
Probes	HI 766063 — Rugged stainless steel penetration K-type thermocouple probe with 1 m (3.3') cable
	HI 766065 — K-type, stainless steel, quick response surface temperature probe with 1 m (3.3') cable
	HI 766063/1 — Stainless steel penetration probe, suitable for food, K-type thermocouple probe with 1 m (3.3') cable

14

Temperature

thermocouple thermometers

K, J, T-Type Thermocouple Thermometers





Dual-channel, K, J, T-Type Thermocouple Thermometers

- HI 2221
  - HI 2222 front view
- IP67
  - Are no longer affected by water ingress that could adversely affect readings
- Battery indicator
  - Battery life levels are shown
- Temperature
  - Automatic cooling
- Backlight
  - Backlit display (HI 98130)
- Connectivity
  - PC and printer compatible (HI 98130)

The HI 98130 and HI 98132 are dual-channel waterproof K, J, and T-type thermocouple thermometers that can switch between the two readings at the touch of a button.

At any time, users can switch views to see all information on either channel, display current temperature and min/max along with the high or low values. Users can also see the difference between the two channels or calculate by taking the high or low of the differences.

The HI 98132 has a backlit display to allow the user to work in low light. The °C/°F button switches between the Celsius and Fahrenheit temperature units. The CLEAR button enters the evaluation of high and low values.

For high accuracy, the HI 98132 features a CAL button to allow the operator a single-point calibration and can be both at 0°C when ice-point exchange occurs.

The HI 98132 also adds an RS232 output that allows for data transfer to a PC or printer.

The instruments are equipped with 60% display cut to the event user's battery alerts the user in the event that low battery power could adversely affect readings.

Specifications		HI 98130	HI 98132
Range	K	-200.0 to 1999.9°C; -328.0 to 3631.9°F; -200.0 to 1999.9°F and -73.0 to 1832.9°F	
	J	-200.0 to 1999.9°C; -328.0 to 3631.9°F and -200.0 to 1200.0°F	
	T	-200.0 to 400.0°C; -328.0 to 752.0°F	
Resolution	K	0.1°C (-200.0 to 199.9°C and 200.0 to 1999.9°C) 0.1°F (-328.0 to 999.9°F); 1°F (1000 to 3631.9°F) 0.1°F (-328.0 to 999.9°F); 1°F (1000 to 1832.9°F)	
	J	0.1°C (-200.0 to 999.9°C); 1°C (1000 to 1200.0°C) 0.1°F (-328.0 to 999.9°F); 1°F (1000 to 2192.0°F)	
	T	0.1°C (-200.0 to 400.0°C) 0.1°F (-328.0 to 752.0°F)	
Accuracy		±(0.3% rdg + 0.5°C) for K and T type thermocouples ±(0.3% rdg + 0.8°C) for J type thermocouples	
Probes		HI 765410 K type fast response bead thermocouple	
CAL Button		n/a	yes
Backlight		n/a	yes
RS232		n/a	yes
Battery Type / Life		(2) 1.5V AAA batteries (HI 98130); (4) 1.5V AAA batteries (HI 98132) / Approximately 1000 hours of continuous use (backlight off); auto-off after 5 minutes of inactivity (can be disabled) (HI 98130); auto-off after 30 minutes of inactivity (can be disabled) (HI 98132) / Low battery indicator is shown when battery life is exhausted	
Environment		0 to 50°C (32 to 122°F); RH 95% max non-condensing	
Dimensions		150 x 80 x 36 mm (5.9 x 3.1 x 1.4")	
Weight		130g (4.6 oz)	
Recommended Accessories		HI 93512 and HI 98132 are compatible with optional HI 92000 PC software for data logging, storing and graphic analysis	
Probes		HI 765410	Stainless steel, general purpose, fast response, 1 m (3.3') cable
		HI 765420	Stainless steel, general purpose, fast response, 1 m (3.3') cable, mini plug (compatible with HI 98130)

HI765 K-Type Thermocouple Probes

HI766PX Series, Probes with Detachable Handle



HI766HD, Probe Handle

HI766EX, Extension Cable



HI766PA, Roller Surface Probe



HI766PB, Surface Probe



Specifications

HI766 K-Type Thermocouple Probes

HI766PC, Penetration Probe





HI766PD, Probe for Air and Gas





HI766PE1, General Purpose Probe





HI766PE2, General Purpose Probe





HI765 K-Type Thermocouple Probes with Handle

HI766C, Penetration Probe





HI766C1, Ultra-Fast Penetration Probe





HI766D Probe for Air and Gas



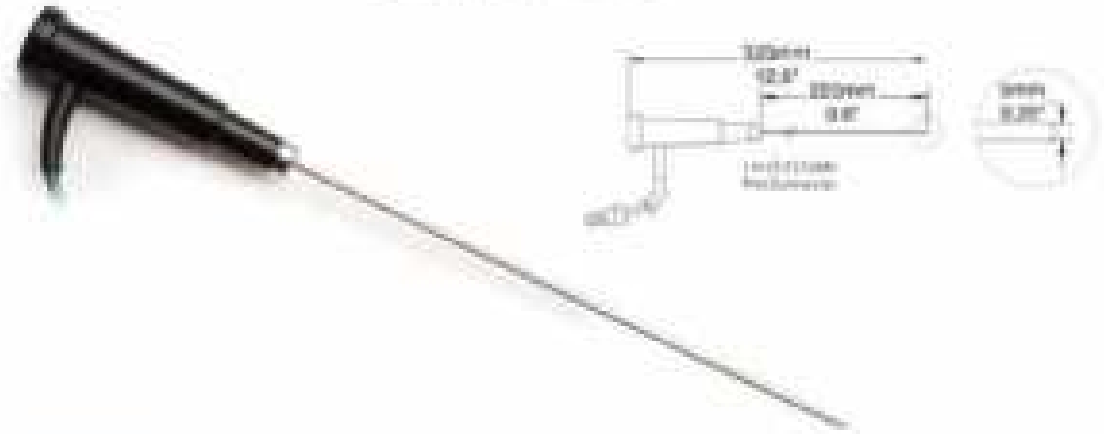


HI766 K-Type Thermocouple Probes with Handle

HI766E1, General Purpose Probe



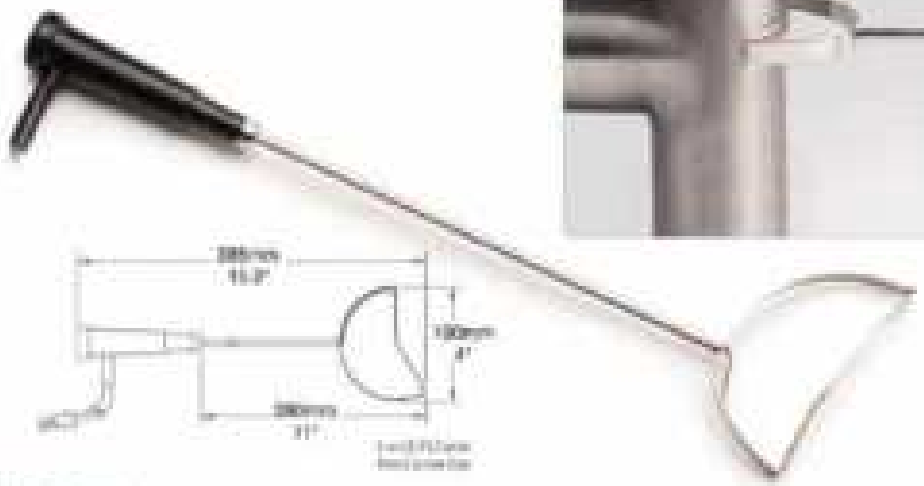
HI766E2, General Purpose Probe



HI765 K-Type Thermocouple Surface Probes

HI766A Roller Surface Probe





HI766B Surface Probe



HI766 K-Type Thermocouple Surface Probes



HI76681, 90° Angle Surface Probe





HI76682, Surface Probe





HI76683, Small Surface Probe



HI765 K-Type Thermocouple Probes for Specific Applications

HI766F, High Temperature Probe





HI766F1, Wire Temperature Probe





HI766 K-Type Thermocouple Probes for Specific Applications

HI766Z, Wire Temperature Probe



HI766TV1, Pipe Clamp Probe





HI766

HI766 K-Type Thermocouple Probes for Specific Applications

HI766TR1, Penetration Probe





Specifications

Item	Application	Max Temperature	Response Time (63% of final value)	Probe Dimensions	Sensor
HI766TR1	semi-solid, liquids	250°C (482°F)	10 seconds	3 Ø3mm (0.12") x 60 mm (2.4")	stainless steel

HI766TR2, HI766TR3, HI766TR4 Penetration Probes





Specifications

Item	Application	Max Temperature	Response Time (63% of final value)	Probe Length	Sensor
HI766TR2	semi-solid, liquids	250°C (482°F)	10 seconds	1 m (3.3')	stainless steel
HI766TR3	semi-solid, liquids	250°C (482°F)	10 seconds	3 m (9.8')	stainless steel
HI766TR4	semi-solid, liquids	250°C (482°F)	10 seconds	5 m (16.4')	stainless steel

HACCP and Food Quality Testing

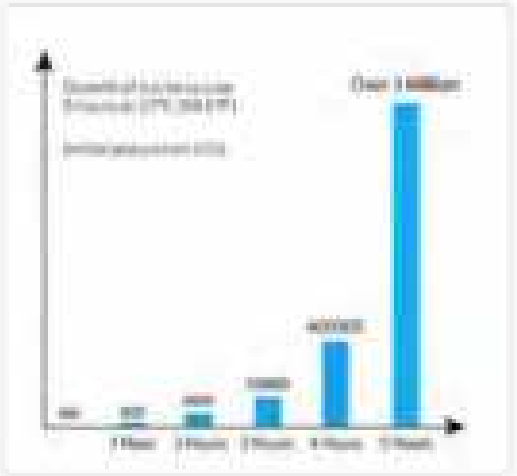
Hanna Thermometers for the Food Sector

Temperature

Heat

Ham and Sausages

Beverages







Milk and Dairy Products



Bread and Pasta



Chocolate



Coffee



Sanitization of Machinery





K-Type Thermocouple Thermometer with Penetration Probe

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14

Temperature

Thermistor Thermometer with Pre-Calibrated Probe



Thermistor Thermometers



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  - Alerts the user of low battery power that could adversely affect readings
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  - Compact, heavy-duty and waterproof

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14

Temperature

Waterproof Thermometer

with Pre-Calibrated Interchangeable Probe





Thermistor Thermometers

14

Temperature

Thermistor Probes

HI762 Thermistor Probes

The HI762 temperature probes can be identified by the grey cap on the top of the handle and have the following specifications:

HI762 Probes

Range	-50.0 to 150.0°C (-58.0 to 302.0°F)
Sensor	NTC thermistor
Accuracy	±0.2°C (±0.4°F)
Probe Handle	ABS
Interchangeable	±0.2°C (±0.4°F)
Probe	316 SS, waterproof
Temperature Calibration Adjustment	Available

The HI762 series with NTC thermistor sensor offers a wide range of probes for measuring liquids, air and gases, and for penetration in semi-solids.

Probes are available with a 1.2 or 10 m (4 or 33 ft) cable and have colored handles for easy identification when measuring different solutions.

HI762P

General purpose, penetration probe with colored handle





Specifications

Cable Length	Cable Color	Handle Color
HI762PW	White	White
HI762PBL	Blue	Blue

HI762A

Thermistor probe for measuring the temperature of air and gases





Specifications

Cable Length	Cable Color	Handle Color
HI762A	1	White

HI762 Thermistor Probes



HI762PWL





HI762L





HI762W



HI765 Thermistor Probes

HI765P





HI765A







HI765 Thermistor Probes

HI765PWL





HI765L





HI765W





14

Temperature

HI765 Thermistor Probes

HI765P





Calibration Test Keys for Thermistor Thermometers







Infrared Thermometers for the Food Industry

- HOLD
  - HOLD Feature
- Battery Indicator
  - Battery life indicator on start-up
- Optional probe temperature (HI9565) and probe humidity (HI9566) measurement

The HI9550 and HI9560 thermometers employ infrared technology to measure surface temperatures. Infrared readings are extremely fast, with a response time typically under one second.

One big advantage of these meters is the non-intrusive nature of measurement. This feature is particularly critical in the food industry, ensuring and maintaining since it translates into facility and labor cost by having product to inspect, especially those products that are sealed.

In order to measure the temperature simply turn on the meter and point to the product or target. Readings are displayed on the LCD. This type of non-intrusive measurement is also useful when the surface temperature is too high to approach for difficult to reach places or for hygiene requirements.

If you must check the core temperature in addition to surface measurement, the HI9560 is the ideal solution for you. Simply attach an optional thermal probe to the meter and you have a 2-in-1, removable thermometer instrument.

A HOLD function freezes the display to allow the user time to record readings.

Specifications		HI9550 (-00 / HI9550-02)	HI9560 (-00 / HI9560-02)
Range	°F	-4 to 392°F	-50.0 to 999.9°F
	°C (HI9560 only)	-20 to 200°C	-45.5 to 537.8°C
Resolution	°F	1°F	0.1°F
	°C (HI9560 only)	1°C	0.1°C
Accuracy	@	±2% of reading or ±2°C	±2% of reading or ±2°C
	Probe (HI9560 only)	±2.0°C (±3.6°F) @ +23°C (+73.4°F) ambient temperature	±0.5°C (±0.9°F) @ +23°C (+73.4°F) ambient temperature
IR Sensor Response Time		1 sec (95%)	
IR Sensor Spectral Response		7 to 14 µm (8 to 14 µm for HI9560-02)	
Emissivity		0.95 (fixed)	
Meets ASTM E1965		12:1 (Target area to distance from meter required to produce a reading of 90% of the total energy detected by the meter)	
Battery Type / Life		9V (approximately 200 hours of continuous use)	
Environment		0 to 50°C (32 to 122°F); max RH 95%	
Dimensions		190 x 80 x 38mm (7.5 x 3.1 x 1.5")	
Weight		200g (7.1 oz)	
Ordering Information		HI9955 [ ] - [ ][ ]	
		x = 1 meter with IR sensor x = 6 meter with IR sensor and HI9565 probe (-50.0 to 150.0°C range)	y = 00 IR range from -4 to 392°F y = 20 IR range from -20 to 200°C (-4 to 392°F)
Probes		HI765PW	Spear temperature/moisture tester, ideal for direct measurements in soft products such as meat, cheese and fruit

Specifications are subject to change without notice. Trademarks are the property of their respective owners.

14

Temperature

pH/ORP Electrodes

4-Wire Pt100 Thermometers



HI768 Series: Pt100 Probes



HI768P: General Purpose/ Penetration Probe



HI768A



HI768L

14

Temperature

dataloggers

14.43

Temperature Dataloggers







Temperature Dataloggers





T-Logger with Locking Wall Cradle





Specifications	HI143
Range	
Resolution	
Accuracy	
Calibration	
Data Logging	
Logging Interval	
Memory Overwrite	
Protection	
Dimensions	
Ordering Information	

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Introduction 15.2

RH

Lux

Hygrometers: Relative Humidity Measurement

Introduction

Accurate and Efficient RH Measurement

Principle of Operation

Calibration

Dew Point





Thermohygrometers

RH and Temperature

- Dew Point (HI9565)
  - HI 9565 also shows the dew point calculated from the measured Temperature and Relative Humidity
- Data Memory (HI9564)
  - The RH/Temperature probe stores calibration information for extra confidence in the readings and replaces without recalibration
- HOLD Feature
  - Current measurement is frozen on the display once max values are captured manually
- BEEP
  - Alerts the user of low battery power that could potentially affect readings
- Backlight (HI9564)
  - Backlit LCD

The HI9564 and HI9565 are two portable thermohygrometers designed to provide peak performance in laboratory environments. The pocket-style HI9564 features a backlit LCD.

In addition to RH and temperature, the HI9565 can display the dew point with the press of a button. Both models have the ability to perform data logging and offer true environmental monitoring where controlled conditions are necessary. Ideal environments include greenhouses, museums, clean rooms and laboratories.

These instruments also feature a HOLD function to freeze the reading on the display for manual recording (MIN/MAX values are updated automatically). BEEP (Battery Error Prevention System) alerts the user in the event that low battery power could adversely affect readings.

The HI9565 RH probe features a built-in memory that stores the calibration data within the probe so it can be used on another hygrometer. The microchip in the probe has the calibration data and environmental limits to enable you to use it anywhere.

Both instruments feature auto-off after 20 minutes of inactivity, temperature readings in Celsius or Fahrenheit, and display codes to indicate overranges and other problems.

Specifications		HI9564	HI9565
RH	Range	0.0 to 99.9% RH	0.0 to 99.9%
	Resolution	0.1% RH	0.1% RH
	Accuracy	±2% RH (2.0 to 98.0% RH) at 0 to 50°C (32 to 122°F) ±3% RH (remainder)	±2% RH (2.0 to 98.0% RH) at 0 to 50°C (32 to 122°F) ±3% RH (remainder)
Temperature	Range	0.0 to 60.0°C 32.0 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 / ±1.0°F	±0.5°C / ±1.0°F
Dew Point	Range	-	0.0 to 60.0°C 32.0 to 140.0°F
	Resolution	-	0.1°C / 0.1°F
	Accuracy	-	±2°C (±4°F) (2.0 to 98.0% RH and 0 to 50°C (32 to 122°F) ±3% RH (remainder)
Additional Specifications	Probe	HI76302 3mm diameter, semi-flexible RH/Temperature probe. Half-duplex communication with digital circuitry. Includes 1m (3.3') cable with DIN connector. IP67 (IEC 60529) rating.	
	Battery Type / Life	9V / approximately 200 hours of continuous use (with BEEP function disabled)	
	Environment	0 to 50°C (32 to 122°F); Max 95% RH non-condensing	
	Dimensions	150 x 70 x 40 mm (5.9 x 2.8 x 1.6")	
	Weight	180 g (6.3 oz.)	
Ordering Information		HI9564 and HI9565 are supplied with HI76302 combination pH probe, battery and instruction manual.	

* Dew Point accuracy is calculated from RH and Temperature accuracy specifications.

** Temperature coefficient: ±0.1°C (±0.2°F)

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Relative Humidity and Lux

Compact Thermohygrometer

with Built-in Sensor

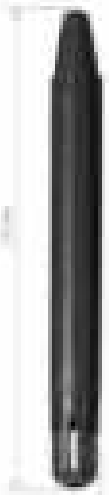


Relative Humidity and Temperature Transmitter



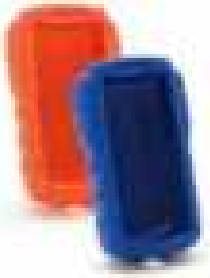
Accessories

Relative Humidity Probe





Calibration



Meter Protection

Probe Caps



15

Relative Humidity and Lux

Portable Lux Meter



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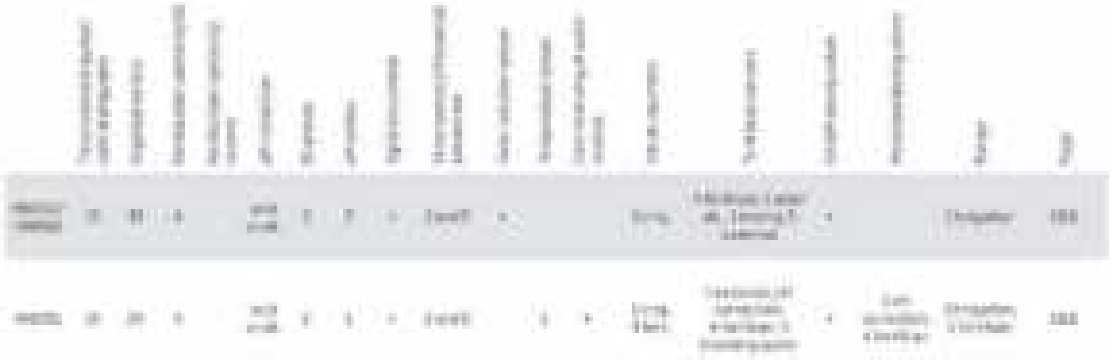


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16 Comparison Guides

Process Instrumentation

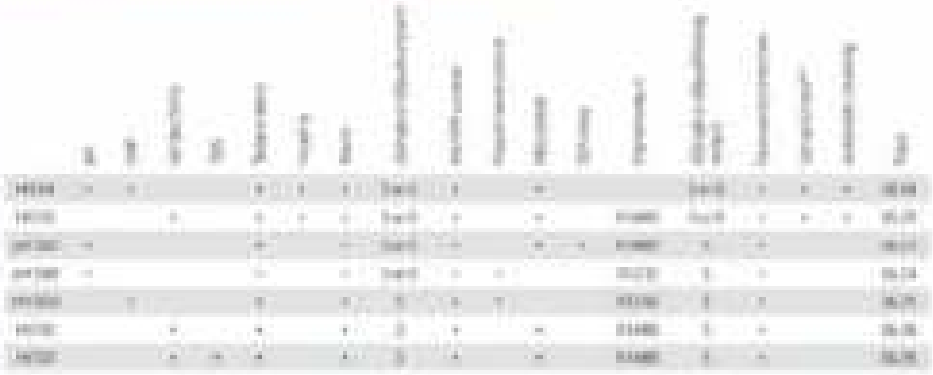
Fertigation Control Systems

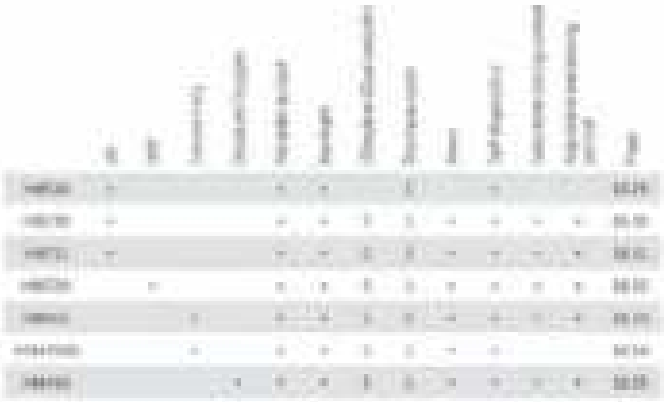


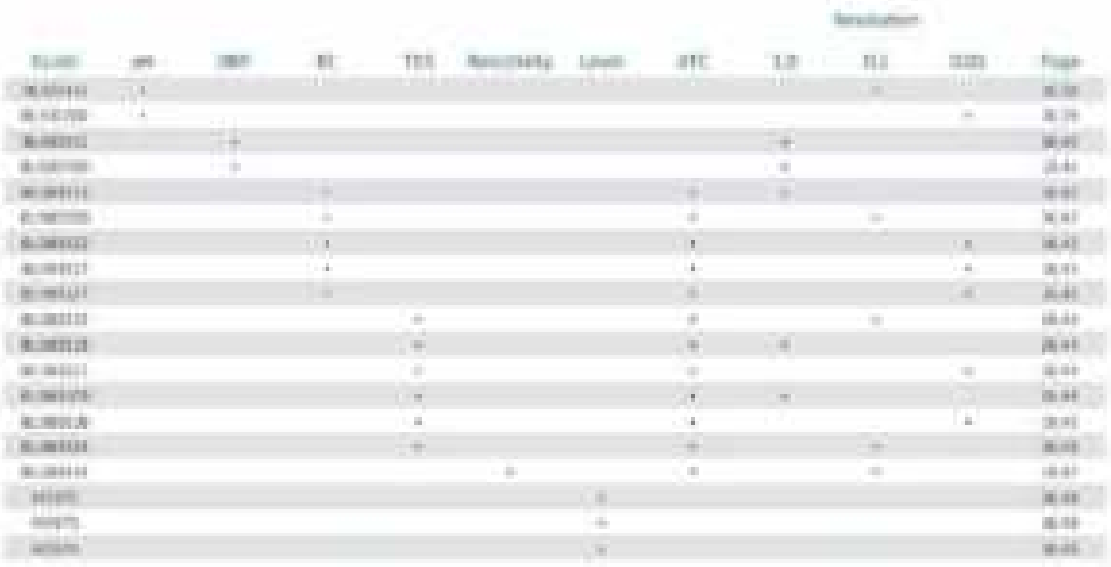
PCA Series Analyzers



Digital Panel Mount Controllers







16 Comparison Guides

Process Instrumentation

Laboratory Instrumentation

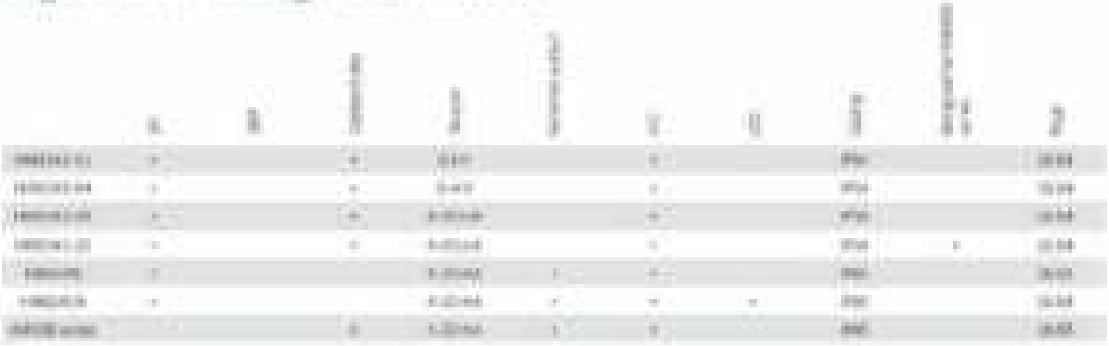
Controller and Pump Systems



Wall Mount Controllers



Digital and Analog Transmitters



Product Spotlights



Fertigation Control Systems

A wide variety of models are available to meet the requirements of specific fertigation applications.

HI9200 series models can be selected based on the irrigation and fertilization type.

Up to 32 irrigation programs can be set by the user with different irrigation parameters, irrigation period, type of irrigation control, irrigation start time and volume to irrigate (time specified for each section, sections to start irrigation sum at time, and unassisted interconnection, day/week basis, right/wrong crops, temperature variations, irrigation another program, priority of programs, number of repetitions). Pre-irrigation and post-irrigation can be defined per sub-zone. Set point of the quantity of fertilizer to dose by pulsing within a conductivity and deviation of ten values. Control of agitators. Digital facility program containing with the irrigation periods.

See page 16.6



Chlorine, pH ORP and Temperature Analyzers

The Hanna PCA 350 series models are chlorine, pH, ORP and temperature process analyzers which continuously monitor a sample stream and control the dosing to adjust the chlorine content and pH.

From drinking and wastewater treatment to the pool and spa recreation, the monitoring of chlorine levels has an important bearing on public health as well as cost and efficiency for treating systems and industrial applications.

See page 16.16



pH/ORP Digital Controller with Sensor Check™

HI931 is a PID, P, proportional or on/off pH/ORP controller with one or two set points. The easy-to-use configuration settings allow control of pH and ORP and permit quick switch between pH and ORP without losing settings. The pH sensor can be calibrated in 2 calibration points. The instrument has a full audio diagnostic processor, Sensor Check™ is also available for pH and ORP probes.

See page 16.19

16

Process Instrumentation

Fertigation Control Systems



Variety and customization of models

Irrigation control

Irrigation programs

Irrigation water



Fertilization control

pH control

Agitators and filter cleaning

Redundancy of EC and pH probes

Logging system

Alarm system



Sensor connections

User interface and digital connection

Internal back-up system



HI8003 (panel mount) and HI8003Z (wall mount) models

HI8003 (panel mount) model



Chlorine, pH, ORP and Temperature Analyzers



Chlorine

Measurement and Control Cycle

Chlorine Control

pH Control

Analog Output

Alarm and Warning System

Logging

Mounting

Specifications		PLA111	PLA120	PLA220
	Range			
	Resolution			
	Accuracy			
pH	Range	-		
	Resolution	-		
	Accuracy	-		
ORP	Range	-	-	
	Resolution	-	-	
	Accuracy	-	-	
Temperature	Range	-		
	Resolution	-		
	Accuracy	-		
additional specifications				
Ordering information				


150


PCA Parts and Solutions
16
Process Instrumentation



Linear control

Proportional control

Derivative action

Integral Action

The integral term magnifies the effect of long-term steady-state errors, applying ever-increasing effort until they reduce to zero. If the actual error is being ignored (due to the controller's output being saturated or some other reason), integral action will wrongly worsen the original fault and will continue to do so until the error is reduced to zero and the set point is achieved.

PID Tuning

PID control is a very powerful and high quality solution for many control processes. The biggest problem of PID controllers is the tuning of the controller to synchronize with the controlled system's parameter. Tuning consists in changing operation until the controller and controlled system have to permit this. High level mathematics offer the auto-tuning of controllers that is possible for the calculation of the exact dose required to correct PID tuning.

Input of the Controllers

Controllers are available with the ground, based on the sensors and actuators. The sensors are the inputs of the controller, the actuators are the outputs of the controller. In heating controllers, the common inputs are the pH, ORP, conductivity, TDS along with temperature for temperature compensation. The probes are connected directly to the controller, or in case of extreme distance between controller and probe, through the transmitters (analog/digital).

Sensor Check™

A pH electrode system consists of a pH-sensitive bulb in contact with a test solution, a connecting cable, and a meter for measurement and adjustments. The measurement is typically set to control a valve or alarm relays for the purpose of maintaining a desired pH value. Many efforts have been invested to such functions as dosage of acids or bases, on/off or proportional control, Automatic Temperature Compensation, the use of amplifiers for distances exceeding 15 meters, panel or wall mounted models, etc. However, little effort has been applied to determining when and what action is when an electrode fails.



For example, let's assume a pH electrode is installed in a tank of wastewater containing heavy ions of chromium. The set point of pH value is 7.0 and, every time the value rises, a pump or solenoid valve are activated to lower such an acid to maintain the set point. Let's also assume that the pH electrode has been damaged and the pH bulb is broken. Under normal conditions, the electrode will produce a potential equal to the difference between the buffer inside the glass bulb (pH 7.0) and the liquid being tested (pH 2.0), i.e. pH (7.0 - 2.0) = approx. 59.16 mV x 5 differential (value not compensated for temperature variations).

Once the glass bulb is broken, a short circuit occurs between the reference wire of the glass electrode (Ag/AgCl) and the reference wire (wire) as a result the pH





Matching Pin: The Ground Loop Effect Solution

Calibration of a Typical Process Meter

Analog or digital transmitters

Controller Output

Alarms and warning

Hold feature

Analog output

Password protection

Panel Mount or Wall Mount Instruments



16

Process Instrumentation

pH/ORP Digital Controller

with Sensor Check™



HI504 Overview

Sensor Check™ pH/ORP

Programmable Cleaning Cycles

Analog Output, Data Logging or PID Dosage Control

The orientation can be set automatically activated from viewing modes whenever Special Checks™ is activated or not. A delay time can be set before action to the reading after activating cycle has taken place. This allows the probe to adjust to new operating conditions.

Logging of the Last 100 Events

With the HI504 series, it is possible to recall the sequence of the last 100 stored events in any selected order. Data shows each stored set parameter (Range) and Reading (value). Every code shown on the display corresponds to a certain type of event, error or operation.

Programmable Hold System

The Hold function allows the user to stop the regulating action of the controller for programmable time periods. It is possible to activate the hold periods in various modes to group several operations, such as pump maintenance and recurring processes.

Fail Safe Alarm System

Hanna's exclusive Fail Safe Alarm System proves to against problems caused by power supply failure or signal interruption, which are typical issues in industrial environments. The system activates in a hardware and a software level. The alarm relay functions in a normally closed condition, and is tripped when there is a power failure. For example, the power cable is accidentally cut. This function is very important in industrial plants where alarms are usually not activated if there is a power supply interruption, which can cause serious damage due to a loss of control of the process point. In the software level, the Fail Safe Alarm System function activates an alarm in case of disconnection mechanisms, for example if the dosing pump is mistakenly closed for an excessive period. The alarm condition is also indicated by a red LED, located directly on the front panel of the controller.

Specifications	HI504
Range	
Resolution	
Accuracy (@20°C/68°F)	
Input Impedance	
Digital Input for Height (HI9813-7 compatible)	Present
Other Digital Measurement Inputs	
Digital Temperature Probes	
Temperature Compensation	
Temperature Probes	
Power Supply (Model HI504 only)	
Power Consumption	
Mini-USB Connection	
Pulse Out (Control Frequency)	2 Hz
Relays 1, 2, 3, 4	
Alarm Setting	
Analog Output	
Analog Output Resolution	12 bit
Analog Output Accuracy	± 0.1 %
Data Logging	
Access Level	
Timing	
Weight	
Ordering Information	Check probe compatibility with meter Choose your configuration HI504XXX1 dual temperature and DO and PID control single analog output 4-20mA HI504XXX2 dual temperature and DO and PID control single analog output 0-1V HI504XXX-0 dual temperature and DO and PID control dual analog output (4-20mA, 0-1V) HI504XXX-1 dual temperature and DO and PID control dual analog output (4-20mA) HI504XXX-2 dual temperature and DO and PID control dual analog output (0-1V) HI504XXX-3 dual temperature, pH/mV and DO and PID control dual analog output (4-20mA) HI504XXX-4 dual temperature, pH/mV and DO and PID control dual analog output (0-1V)
Probes	HI7609 Stainless steel RTD probe with 4 meter (13.2') DIN 7-pin plug and double S cable HI7662 Glass RTD probe with 4 meter (13.2') DIN 7-pin plug and double S cable

www.hannainst.com | HANNA instruments

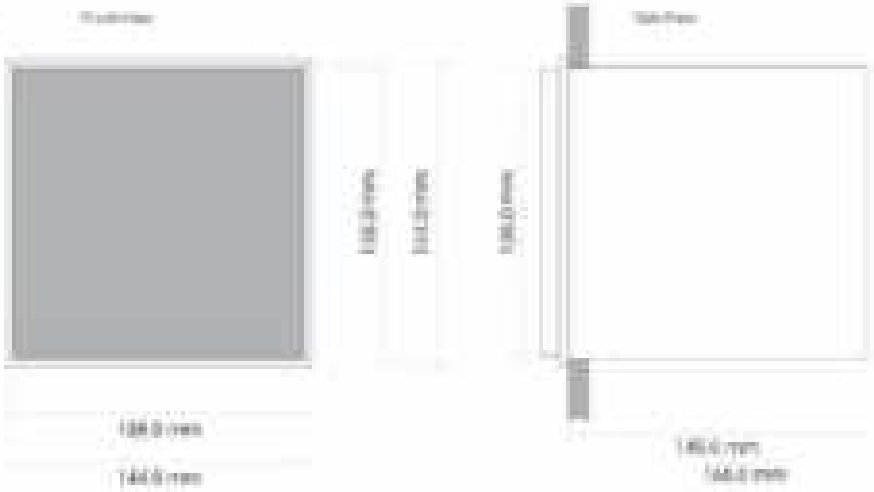
Conductivity Process Digital Controller

with Inductive Probe



HI720 Overview

In-Line Cleaning



Specifications	HI221
Range	
Resolution	
Accuracy @25°C (77°F)	
Calibration Compensation	
Calibration Points	
Temperature	
Digital Filter	
Display Backlight	
Measurement Units	
Display	
Alarm Relay	
Alarm Setting	
Application Category	
Power Supply (Model HI221-01 tested)	
Power Consumption	
Predicted Battery Lifetime	
Environment	
Protection	
Weight	
Ordering Information	
Probes	

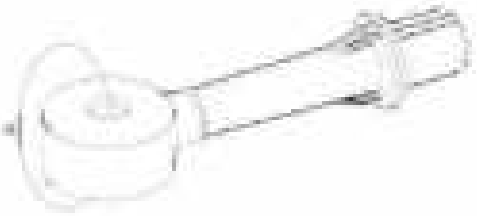
16

Process Instrumentation

Inductive Conductivity Probe

for HI7820

EC Inductive Probe Theory of Operation







pH Digital Controllers

with Matching Pin and PID Control

16

Process Instrumentation

pH Digital Controllers

with Matching Pen





ORP Digital Controller

with Matching Pin

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

[illegible]

Specifications	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

16

Process Instrumentation

Conductivity and TDS Digital Controllers

with Four-ring Potentiometric Probe





Analog Process Controllers



Panel Mounted Controllers

Alarm Feature

Recorder Output

Low or High Impedance Input and Analog Inputs

Current Feature

Quality Construction

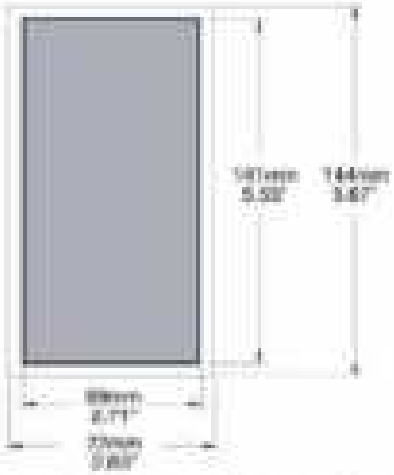
LED Indicators

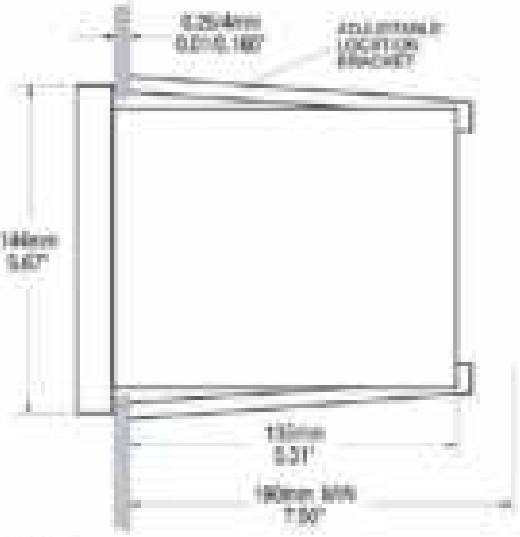


16

Mechanical Dimensions for Panel Mounting











pH Analog Indicator

with Self Diagnostic Test

- IP65
- Backlight

Specifications	
Range	
Resolution	
Accuracy @20°C (68°F)	
Input	
Power Supply	
Case Size	
Dimensions / Compatibility	
Recorder Output	
Housing	
Power Supply	
Enclosure	
Environment	
Panel Cutout	
Weight	
Ordering Information	
Accessories	HI76317
	HI76317/1
	HI76317/5
	HI76317/10

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Process Instrumentation

pH Analog Controller

with Self-Diagnostic Test



Specifications	HI8713
Range	
Resolution	
Accuracy @20°C (68°F)	
Power	
Power Supply	
Construction	
Temperature Compensation	
Alarm Output	
On Alarm Delay	
On Alarm Hysteresis	
Alarm Relay	
Alarm Range	
Control Relay	
Dosing Control	
Dosing Interval	
Housing	
Power Supply	
Environment	
Environment	
Power Consumption	
Weight	
Ordering Information	
Accessories	HI8427 HI8427/01 HI8427/02 HI8427/03



pH Analog Controller

with Dual Output and Self-Diagnostic Test

- Wizard
  - Fail-Safe Alarm System
- ATC
  - Automatic temperature compensation
- Backlight
  - Blinking LCD Display

HI8711 allows the easy control of two set points with two independent outputs for on/off and pulse/pwm designs.

Each model accepts either a direct input from a pH or ORP electrode or from a transmitter through 4-20 mA signal. The instrument also provides +5V power supply and input terminals for amplified electrodes. In addition, you can choose the output configuration for connecting a recorder as 0-5 V, 1-5 V between 0-20 and 4-20 mA.

The HI8711 incorporates adjustable overtime dosing protection from 0 and 5 to 60 minutes. If dosing exceeds programmed time, the alarm will be triggered and the dosing contact will deactivate. This feature can be set as disable or deactivated.

A retransmitable 3-wire current signal proportional to the linear parameter

Specifications	HI8711
Range	
Resolution	
Accuracy @20°C (68°F)	
Input	
Power Supply	
Calibration	
Temperature Compensation	
Recognition Input	
pH Relay Delay	
pH Relay Range	
Alarm Delay	
Alarm Range	
Timing Device	
Dosing Timeout	
Backlight	
Power Supply	
Enclosure	
Environment	
Panel Cutout	
Weight	
Ordering Information	
Accessories	HI8427 pH / ORP electrode simulator HI8424/01 pH / ORP electrode simulator with accuracy HI8621/01 pH electrode HI8621/13 pH electrode with 1 m cable

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Process Instrumentation

ORP Analog Controller

with Self-Diagnostic Test





EC Analog Controller

with Input from Probe or Transmitter

- EC
  - Automatic temperature compensation
- Backlight
  - Backlit LCD display

Specifications				
Range				
Resolution				
Accuracy (@20°C/68°F)				
Input Type/Transmitter				
4 to 20mA Range				
Alarm Range				
Temp. Compensation				
Inputs				
Output Relay/Pump				
Calibration				
Recorder Output				
Set Point and Alarm Relay				
Keying Device				
Alarm Hysteresis				
Backlight				
Power Supply				
Enclosure				
Environment				
Power Output				
Weight				
Ordering Information				

EC Analog Controller

with Direct Input from Potentiometric Probe





Dissolved Oxygen Controller

with Extended Range and Analog Output

- Ideal for
  - Fish farm recirculation systems
- With
  - Automatic temperature compensation

The HI98193 is a panel mountable dissolved oxygen controller that is used to maintain and monitor the concentration of DO in a wide range of industrial process applications. The HI98193 uses a galvanic probe that typically requires less maintenance than a polarographic style making it ideal for long term monitoring.

The setpoint for controlling the activation of a relay is adjusted manually by the user. An alarm relay is also manually adjustable and is activated when a user sets it from the programmed setpoint. This controller features single point calibration in zero oxygen solution.

The dosage mode automatically determines ON or OFF and over dosage control by sensing the concentration of dosage. It monitors if the dosing relay remains continuously activated for more than the selected dosing time, the alarm relay is activated, the alarm LED will start blinking and the dosing relay will be deactivated. A user can adjust on the controller to stop pump(s) dosing the "over time dosage" by hand.

The probe is provided with a membrane covering the galvanic cathode and a built-in thermistor for temperature measurement and compensation.

Any system can be cost effectively monitored 24/7



BL mini controllers are the perfect solution for water analysis and control

pH Mini Controllers

Monitoring and controlling pH in water conditioning and industrial applications is essential for water quality and maintaining efficient chemical dosing and treatment. In the case of industrial effluent neutralization of acidic waste is critical for environmental safety and public health. In boiler feed water conditioning, a pH of 8.5 to 9.5 can help prevent scaling and corrosion of internal components. Maintaining a pH of 7.4 to 7.6 is fundamental for proper and efficient sanitization in swimming pools and spas. The effects of pH control are, to name a few, degreasing in cleaning processes in

ORP Mini Controllers

ORP (oxidation reduction potential) is the most dependable and consistent indicator of the sanitizing effectiveness of your process, or water treatment. A variety of chlorine, peroxide, and ozone are added. The ORP value increases, providing a direct indication of the cleaning power of the water. Typically, an ORP value of 650 to 700 mV or more of CL2 indicates that your water is properly treated and all harmful bacteria are killed in less than 1 second. ORP is also essential in chemical processing where reducing agents are used and a negative ORP value indicates proper neutralization.

Conductivity Mini Controllers

In water, an increase in conductivity indicates an increase in water hardness and subsequent scale formation. Conductivity monitoring and control is essential in creating high purity water and maintaining water quality. Water with a conductivity value of 0 to 0.055 µS/cm is considered "very pure" while 0.40 to 0.60 µS/cm is considered "pure" water. An increase in conductivity indicates an increase in the amount of damaging dissolved solids (salts) present in water. Conductivity monitoring and control is essential in industrial applications such as feed water control, blow down activation in cooling towers and water management. In these applications, high conductivity will cause scaling and corrosion of piping and damage to critical components.

TDS Mini Controllers

A TDS (total dissolved solids) measurement is an important indicator of water quality. An increase in TDS indicates an increase in the amount of dissolved solids (salts) present in the water. TDS monitoring and control is responsible in reducing applications such as feed water control, blow down activation in cooling towers and water management. In these applications, high TDS will cause scaling and corrosion of piping and damage to critical components.

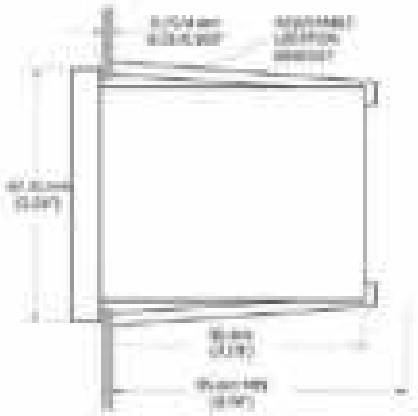
A TDS measurement is also an important indicator of the efficiency of water conditioning, an increase in TDS (ppm) indicates an increase in water hardness and a decrease in purity. This will affect the quality of drinking water, feed water and rinse water. TDS monitoring and control is crucial in reducing water hardness and increasing water quality and usability.

Resistivity Mini Controller

Resistivity, measured in Ω•M, is the easiest way to measure the quality of water produced by high purity systems, such as reverse osmosis (RO) systems and water conditioning equipment. As resistivity is the reverse of conductivity, it provides an accurate check of the cleanliness of water with very low levels of ionic salts. As these systems become less effective, the resistivity value will increase, indicating a need for maintenance and/or replacement of the consumable components. Properly functioning RO and water conditioning systems will consistently produce water with resistivity readings in the range of 10 to 18 MΩ•cm.

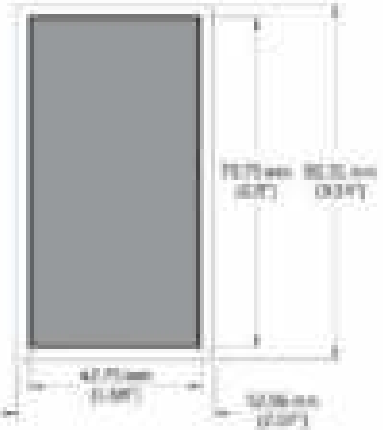
Hanna Mini Controllers

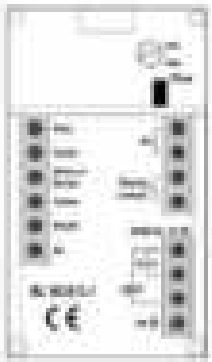
BL Series Mechanical Dimensions

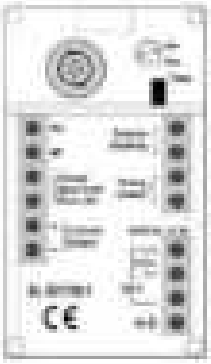




Side View







Front View

Rear View

Rear View

16

Process Instrumentation

pH Mini Controller



pH Mini Controller

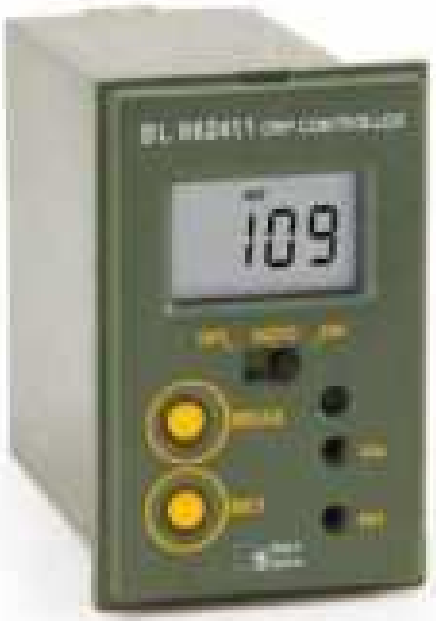
with 4-20 mA Recorder Output



16

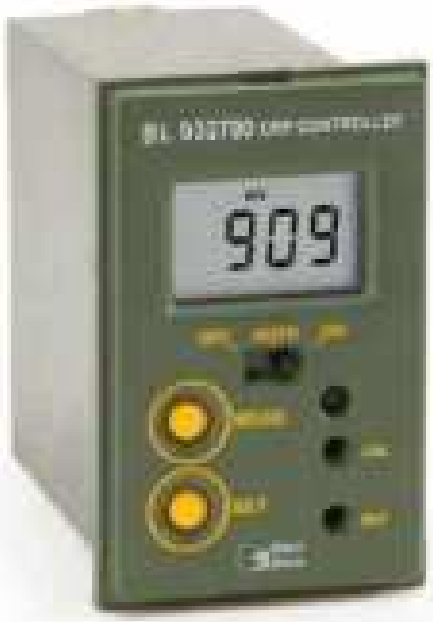
Process Instrumentation

ORP Mini Controller



ORP Mini Controller

with 4-20 mA Recorder Output



16

Process Instrumentation

EC Mini Controllers

Measuring in µS/cm



EC Mini Controllers

Measuring in mS/cm



16

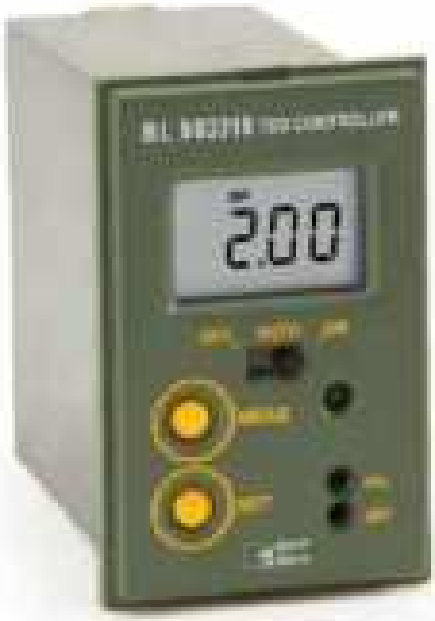
Process Instrumentation

TDS Mini Controllers



TDS Mini Controllers

0 to 10,000 ppm



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Process Instrumentation

TDS Mini Controllers



Resistivity Mini Controllers



Specifications	
Range	
Resolution	
Accuracy @20°C (68°F)	±2%FS
Temperature Compensation	automatic, external sensor from 0 to 100°C (32 to 212°F)
Temperature Coefficient	0 to 4 %/°C (0 to 2.2 %/°F) selectable through jumpers on the circuit board
Calibration	factory calibrated
Alarm/Relay	one relay with SPDT contact rated for 3A @ 250 Vac, 30 Vdc resistive load; alarm latching or unlatching
Sensors	adjustable from 0.1 to 2000 MΩ/cm
Electrode	supplied with 1 type HI 76302/3 K=10 conductivity/resistivity 3/4 in probe
Power Supply	12 to 24 Vac/dc ±10% adapter included; 90 to 264 Vac (47 to 63 Hz) operation
Dimensions	90 x 50 x 100mm (3.5 x 2 x 3.9")
Weight	200g (7.1 oz) approx. (controller only); 800g (1.76 lbs) approx. (packaged)
Ordering Information	HI 98311 is supplied with probe, mounting bracket, and instruction manual
Recommended Probe	HI 76302/3 conductivity/resistivity 3/4 in probe with 3 m (9.8') cable and connector

The HI 98311 is a versatile in-line resistivity controller designed for up to two water conditioning applications. The HI 98311 monitors and controls the resistivity of ultra pure water. Setpoint and calibration are manually adjusted with a screwdriver and the alarm relay allows for simple control.

Readings are automatically temperature compensated, with three different coefficients (0, 2.0, or 4.5 %/°C). The alarm contact can be used for conductivity or for the pump turnover in dosing systems.

The relay contact is open when readings are higher than the setpoint, while the measurement is lower than setpoint. The relay contact is closed. The hysteresis is typically 0.2 MΩ/cm from the setpoint.

Measurements are displayed on the LCD and the built-in colored LED continuously indicates if the controller is in measurement, dosing, or alarm mode. Users can choose automatic or manual tuning mode with a switch on the front panel. Manual control is particularly useful during maintenance operations, because it permits operators to enable or disable the dosing relay as they need.

The user-friendly control system advises users when the relay is activated for too long, helping to prevent overdosage.

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Process Instrumentation

Mini Level Controllers



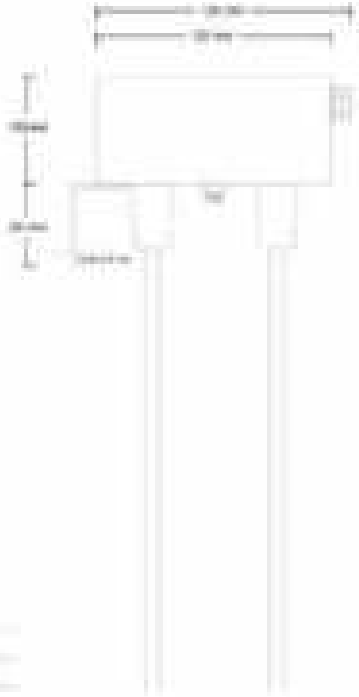


Level Transmitter









MEADOS pH and ORP Measuring and Dosing System

Black Stone by Hanna

Two Advanced Instruments in One

Easy Installation

Rugged Construction

Superior Materials

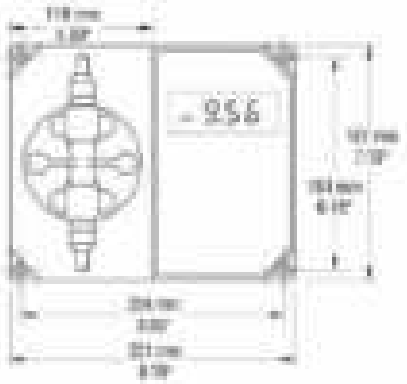
Simple Pump Action

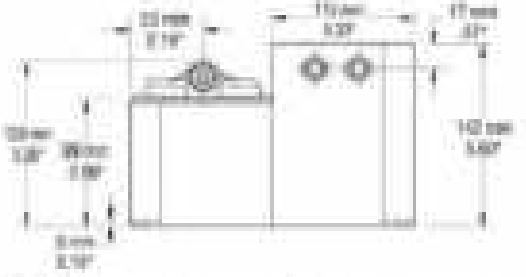
Proportional Dosing

Isolated Recorder Output

Alarm Output

Auxiliary Dosing Contacts





Black Stone
by Hanna

pH Controller and Pump



- pH controller and dosing pump
- LCD pH value
- Automatic 4-20mA recorder output
- Proportional dosing
  - Slows the pump down when the measured pH level approaches the set value, which ensures precise dosing and avoids costly waste of chemicals due to overdosage
- Alarm relay(s)
  - Activated whenever the pH value varies more than 2 pH units from the set point
- Auxiliary contacts
  - Allow the user to attach a relay or pinching pump that is automatically when the pump is dosing
- IP65 (NEMA 4) rated enclosure
  - Used for all parts that come into contact with liquid

Type/Accessories	
Range	
Resolution	
Accuracy @20°C (68°F)	
Repetition	
Alarm Monitoring	
Display	
Pacing/Dosing	
Alarm/Control	
Calibration	
Temperature Control	
Power Supply	
Environment	
Dimensions	
Weight	
Shipping Contents	

16

Process Instrumentation

ORP Controller and Pump



Wall-Mounted Process Controllers



Reliable, High Performance Wall Mounted Controllers

Alarm Feature

Isolated Recorder Output

High Impedance Input

Quality Construction

HI2K Advanced Controllers



Wall-Mounted Process Controllers



Simple to Use

The large dual-level LCD shows both primary measurement and temperature and quickly operator's through user-friendly programming with step-by-step prompts. The choice of ON/OFF proportional PID control provides extra versatility and makes it possible to set the process controller that best fits your application. Wiring is also of minimum concern as different parts is made easy. These advanced controllers can be identified and configured at factory and process fit.

Save Money with Custom Programs

Help to prevent overdosing or costly system failures. You can set your high and low set point independently to fine tune dosing process with the ON/OFF controllers. Similarly, the proportional band and time period are user-programmable to avoid on-off cycling. Chemicals which are commonly overdosed.

All models offer an adjustable overdosing timer from 00 minutes to 7 days or the equivalent time that the relay remains may remain closed. An important feature in case of sudden change in pipeline, to control and make efficient dosing and other calendars.

Fail Safe Protection

The Fail Safe feature protects process equipment during interruptions, surges and human errors. The control panel will easily to use system resolve these problems can save money, hardware and software. To eliminate false out and line failure problems, this alarm function operates in a "normally closed" mode and goes off if the wires are accidentally tripped, or when the power is down. This is an important feature since with most dosing's the alarm terminals close to personnel shutdown, but no alarm is sounded and, other errors goes, causing extensive damage. With our controllers, software is configured to cut off the alarm in abnormal circumstances, for example, if the dosing terminals are closed for long a red LED will provide a visual warning signal.

Differential Input (Matching Pin)

All Hanna controllers in this family come with a different set input to prevent problems due to ground loop current. With this new feature, the life of the switch is extended and the probe is protected.

Password Protection

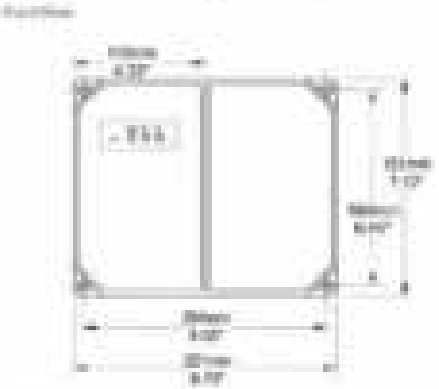
The Hanna password protection feature keeps these controllers safe from tampering. Only users with the proper password can change the settings of these controllers.

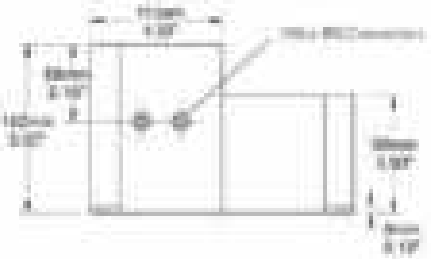
Simple Installation

These wall-mounted controllers have mounting holes molded into the housing to secure them quickly and easily without the need for additional hardware. Once in place, the cover can be easily removed and installed over the front panel, making it possible to perform all adjustments without disassembling any part of the unit. Temperature sensors are also included. Simply screw each probe into its matching thermowell and plug the connector's input and will be powered up through the unit's internal power supply.

Mechanical Dimensions

The modular design simplifies electrical connections to a closed compartment, while the control settings are accessible and can be made through the adjacent compartment.







Industrial Grade pH Digital Controllers

Wall Mounted with Matching Pin

- CAL Check™
  - Alerts users of calibration status
- Alarm
  - Fail-Safe Alarm System
- ATC
  - Automatic temperature compensation
- 3 Point Calibration
  - Up to three point pH calibration

The HI221 controllers are simple to operate, microprocessor-based pH transmitter/controllers packed with features, which HI221 puts at your fingertips. Three point calibration on pH 4.01, 7.01 and 10.01 buffers ensures maximum accuracy. You can choose from ON/OFF, proportional and PID control to suit your application. These instruments have a differential digital processing which cuts down any electrical ground loops present through the reference.

Password protection prevents unauthorized modifications to settings or calibration. Medical Safe Alarm system protects the HI221 against the pitfalls of process control like power interruptions or line failure.

Optional labor terminal module makes wiring a snap. A host of user friendly features and user friendly functions make the HI221 a great value.

For more flexibility and control, choose the HI2211 controller, which connects to a computer for the remote control of the instrument. The HI2211 is equipped with a bi-directional RS485 port, which allows complete control of the instrument over a PC.

Type of Controller	HI221
Range	
Resolution	
Accuracy	
Input Impedance	
pH Calibration	
Temperature Compensation	
Analog Output	
Digital Output	RS485
Memory Level	
Alarm Relay	
Power Supply Input	
Power Supply	
Power Consumption	
Operating Environment	
Protection	IP 54
Dimensions	
Weight	
Ordering Information	Each HI221 model is supplied with instruction manual **Choose your configuration:** **HI 221 0** dual setpoint on/off control w/ relay output (115) **HI 221 0 P** dual setpoint on/off control w/ relay output (230)

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HI221

Industrial Grade ORP Digital Controllers

Wall Mounted with Matching Pin

- CAL Check™
  - Alerts users of calibration status
- Alarm
  - Full Safe Alarm System
- Connectivity
  - PC compatible

The HI221 has been engineered with the same rugged handling quality and features as the HI21 meters.

The Full Safe Alarm System protects the system against the pitfalls of process control. We power / alarm failure or malfunction. User selectable timing capability safeguards against overdosing and saves money while protecting the environment. RS485 capability means this model PC compatible. The microprocessor memory is fully programmable and has a 6 month back up power supply.

The electrodes used have a different technique providing zero impedance by eliminating ground loop current. Through the software, users can choose between ON/OFF and proportional control as well as latest cable cut alert and voltage outputs. For more flexibility and better resolution the chart recorders, choose any two points between 0 and 2,000 mV to be assigned to the analog output (user).

Wiring the controller is a breeze with extra wide terminal modules. A thumb cut-out routing for buttons and cover. Friendly functions make HI221 a great value.



Specifications	HI221
Range	
Resolution	
Accuracy @ 20°C (68°F)	
Input Impedance	
Calibration	
Analog Output	
Alarm Output	
Relay Control	
Alarm Relay	
Power Supply Type	
Power Supply	
Power Consumption	
Alarm Control Function	
Environment	
Protection	
Dimensions	
Weight	
Ordering Information	
	HI221111
	HI221112



Industrial Grade EC Digital Controllers

Wall Mounted with Four-ring Potentiometric Probe

16

Process Instrumentation

Industrial Grade pH and Conductivity Controller

with Proportional Control of Fertilization





Industrial Grade pH and TDS Controller

with Proportional Control of Fertilization

- Ideal for
  - Fertigation systems
- With
  - Pulse output, temperature compensation

is a pH and TDS controller for fertilizer solution dosage in hydroponics.

measures pH from 0 to 14 and TDS from 0 to 2999 mg/L (ppm). Two separate set points can be adjusted from 4 to 7 pH and 500 to 2800 ppm (mg/L). The relays are activated when the pH exceeds the set point or TDS falls below the dosed value. Two pumps or electrovalves can be wired directly to the controller and be powered through the connectors. Independent proportional settings for pH and TDS can be adjusted from 0 to 60 seconds. The TDS set point is 0 to 400 mg/L (ppm) for 700 ppm mixing and proper solution temperature for the appropriate temperature electrode. The analog output is for recording

provides for an alarm relay which is activated by connectors and sensors. These include when the pH is below the set point or the operator accurately thresholds of 0.5 to 1.0 pH, or when a TDS exceeding the set point by a value within 50 to 400 mg/L (ppm) range. The alarm also goes off if the pH and/or TDS are not corrected within the operator determined time frame of 1 to 10 minutes. Moreover, the alarm can be silenced through the keypad or left active until

accepts pH electrodes with a BNC connector and TDS probes with a DIN connector.

Specifications	
Range	
Resolution	
Accuracy (@20°C/68°F)	
Hysteresis/deadband	
Calibration	
Setpoint	
Temperature Compensation	
Alarm	
Proportional Control	
Power Supply	
Environment	
Case/Material	
Dimensions	
Weight	
Ordering Information	

Industrial Grade pH Controller

with Single Set point and Proportional Dosage





Industrial Grade EC Controller

with Proportional Fertilizer Dosing for Hydroponics Applications

- Stable
  - Fail Safe Alarm System
- EC
  - Automatic temperature compensation

HI9910 is a microprocessor type measuring and controlling conductivity in the 0 to 10 mS/cm range. A simple set point allows for precision use in the range of fertilizer solutions. The proportional settings can be fine tuned to tough tasks or conveniently positioned with the front panel. The time cycle is adjustable from 0 to 10 seconds and the proportional band from 0 to 1.0 mS/cm. Calibration and set points have coarse and fine tuning features. A pump or valve must be connected directly to the controller and be powered through the terminals.

HI9910 also provides for an alarm relay which is activated when the measurements exceed the set point by more than the range from 0.0 to 2.5 mS/cm. The alarm also triggers if due to a malfunction, the continuous dosing time exceeds the operator adjustable period of 1 to 10 minutes. The alarm can be configured in either normally closed or open position for use in fail-off dosing applications. HI9910 also provides an isolated analog output which is user selectable between 0-20 or 4-20 mA.

Having flow-through conductivity probes reading in mS/cm connects can be quickly attached to the HI9910. Readings are automatically compensated for the effects of temperature in the 0 to 50°C (32 to 122°F) range. For quick and easy wiring, HI9910 comes with its own cable terminal brackets. Seven LEDs show whether the set point or alarm relays have been activated.

Type/Accessory	HI9910
Range	0.00 to 10.00 mS/cm
Resolution	0.01 mS/cm
Accuracy	±2% f.s.
Calibration	Through 1380 µS/cm and 12.88 mS/cm Standards
Set point	1 point 0.0 to 10.0 mS/cm
Temperature Compensation	automatic, 0 to 50°C (32 to 122°F) with β=2.0%/°C
Electrode Connection	4 pin DIN 7 pin DIN to BNC adapter included
Proportional Band	0.0 to 1.0 mS/cm in 0.1 mS/cm increments
Proportional Cycle	0 to 10 seconds in 1 second increments
Alarm Function	Activates when the measurement exceeds the set point by more than the range from 0.0 to 2.5 mS/cm in 0.5 mS/cm increments. Alarm also triggers if due to a malfunction, the continuous dosing time exceeds the operator adjustable period of 1 to 10 minutes. The alarm can be configured in either normally closed or open position for use in fail-off dosing applications. HI9910 also provides an isolated analog output which is user selectable between 0-20 or 4-20 mA.
Analog Output	0 to 20 mA or 4 to 20 mA (user selectable)
Alarm Relay	1 SPDT 5A @ 250 VAC resistive load
Wetted Parts	Polypropylene, Stainless Steel, Viton®
Power Supply	115 VAC, 50/60 Hz, 230 VAC, 50/60 Hz
Environment	0 to 50°C (32 to 122°F); Maximum RH 95% non-condensing
Case/Protection	Polycarbonate, wall mounting, IP65
Dimensions	175 x 185 x 80 mm (6.9" x 7.3" x 3.1")
Weight	1.1 kg (2.5 lb)
Ordering Information	HI9910 Industrial Grade EC Controller with Proportional Fertilizer Dosing for Hydroponics Applications Choose your configuration: HI9910-1 115V HI9910-2 230V

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Process Instrumentation

Industrial Grade TDS Controller

with Proportional Fertilizer Dosing for Hydroponics Applications



Digital and Analog Transmitters for pH, ORP and Conductivity



Two-Wire pH & ORP Transmitters

Conductivity Four-Ring Technology

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Process Instrumentation

Multiparameters

ISO14

pH and EC Transmitter

with Galvanic Isolated Output





pH Transmitters

with 4-20 mA Galvanically Isolated Output

- ATC
  - Automatic temperature compensation
- Waterproof
  - Water resistant
- Backlight
  - Blue/Red LCD display

The HI8014N is a water resistant pH transmitter is designed to be used with a standard high impedance pH probe with BNC connector. The signal is then processed by a special high-impedance amplifier, which transmits a proportional current directly proportional to the input signal but independent of changes in lead or cable resistance.

Calibration is performed by the adjustment of two independent parameters – slope and offset.

Temperature compensation can be made by the transmitter's ATC (Automatic Temperature Compensation) probe or by a known measurement to be taken with a temperature probe and made if ATC is not required. It is also possible to substitute a fixed value for the temperature probe. The transmitter can be connected to Hanna controllers (HI931, HI8710 or HI8711), recorders, computers or any data monitoring device that accepts 4 to 20 mA input.

HI8014C versions allow easy verification and recalibration of the probe's value and is easier to calibrate and maintain.

Type/Part number	HI8014N + HI8014-0.5L
Range	0.00 to 14.00 pH / 0.0 to 140.0 °C
Resolution (for °C models)	0.01 pH / 0.1 °C
Accuracy (@20°C/68°F)	±0.05 pH ±0.05 mV
Calibration	offset ±2 pH / 0.0 to 2.00 mA, slope 80 to 120% / 4.0 to 20 mA
Temperature Compensation	Manual or automatic from 0 to 50°C (32 to 122°F) with HI7662 probe
Input Impedance	200 TΩ typ.
Remote Probe	0.5 m (1.6') cable
Protection	IP65
Power Supply	11 to 24 Vdc, 20 to 22 Vac, 1 W max. @ 24 Vdc
LCD Display	Backlit, 3½ digits
Load	0 to 1000 Ω max.
Environment	0 to 50°C (32 to 122°F); 95% max. RH non-condensing
Dimensions	130 x 120 x 75 mm (5.1 x 4.7 x 3.0")
Weight	1 kg (2.2 lb)
Ordering Information	HI8014N: pH transmitter supplied with instructions



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Process Instrumentation

Transmitters

Conductivity Transmitters

to use with Four-ring Probe





Specifications				
Range				
Resolution				
Accuracy				
Calibration				
Temperature Compensation				
Conductivity Factor				
Measure Output				
Protection				
Power Supply				
LCD Display				
Environment				
Dimensions				
Weight				
Ordering Information				



4-20 mA Amperometer

Simulator and Calibrator

- Measurement Calibration mode
  - allows the user to check the process meter accuracy
- Simulation mode
  - simulates the correct current values to ensure the correct operating power for the loop communication. Power is provided through an external adaptor (included) which is connected to the simulator. This mode is ideal for calibrating chart recorders, process transducers or loop indicators.
- Measurement Testing mode
  - allows the user to check the 4-20 mA circuit values transmitted by the process meter.
- Setup mode
  - allows the user to set the 4-20 mA output to calibrate your process meter.

Specifications		
Ranges		
Accuracy		
Input Resistance		
Fuse		
Power Supply		
Environment		
Dimensions		
Weight		
Ordering Information		



BlackStone Chemical Dosing Pumps



Versatility

Stroke Operation

High Quality Materials

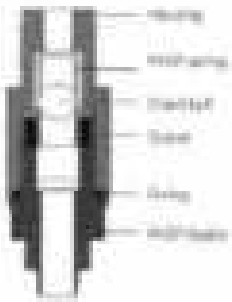
Chemical Resistance Guide*

Chemical	PVC	PP	Hypalon	EPDM PEM	PVDF	PTFE

BL Series Dosing Pumps

Rugged Design

Typical Installations



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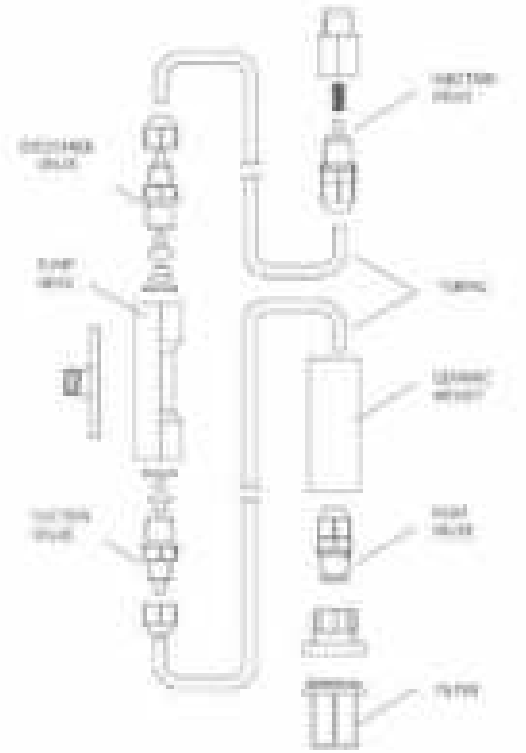
Process Instrumentation

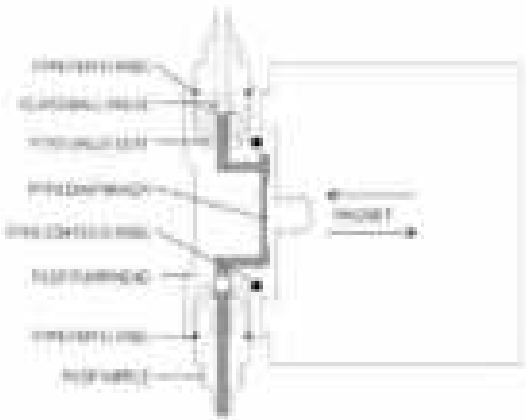
BlackStone Pumps

Replacement Parts

for BlackStone Chemical Dosing Pumps

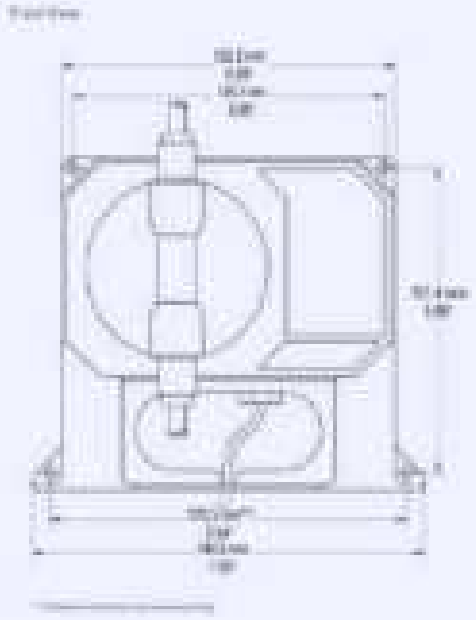
Assembly Diagram

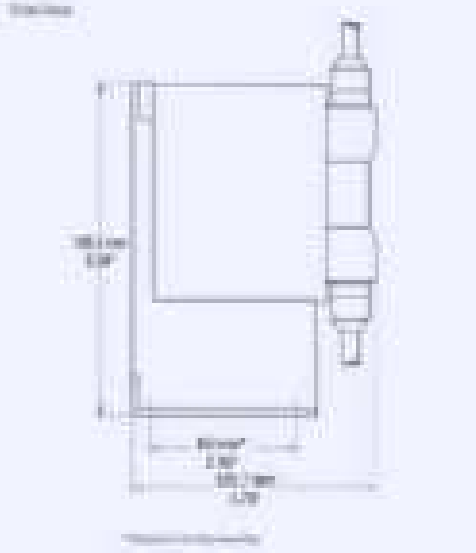


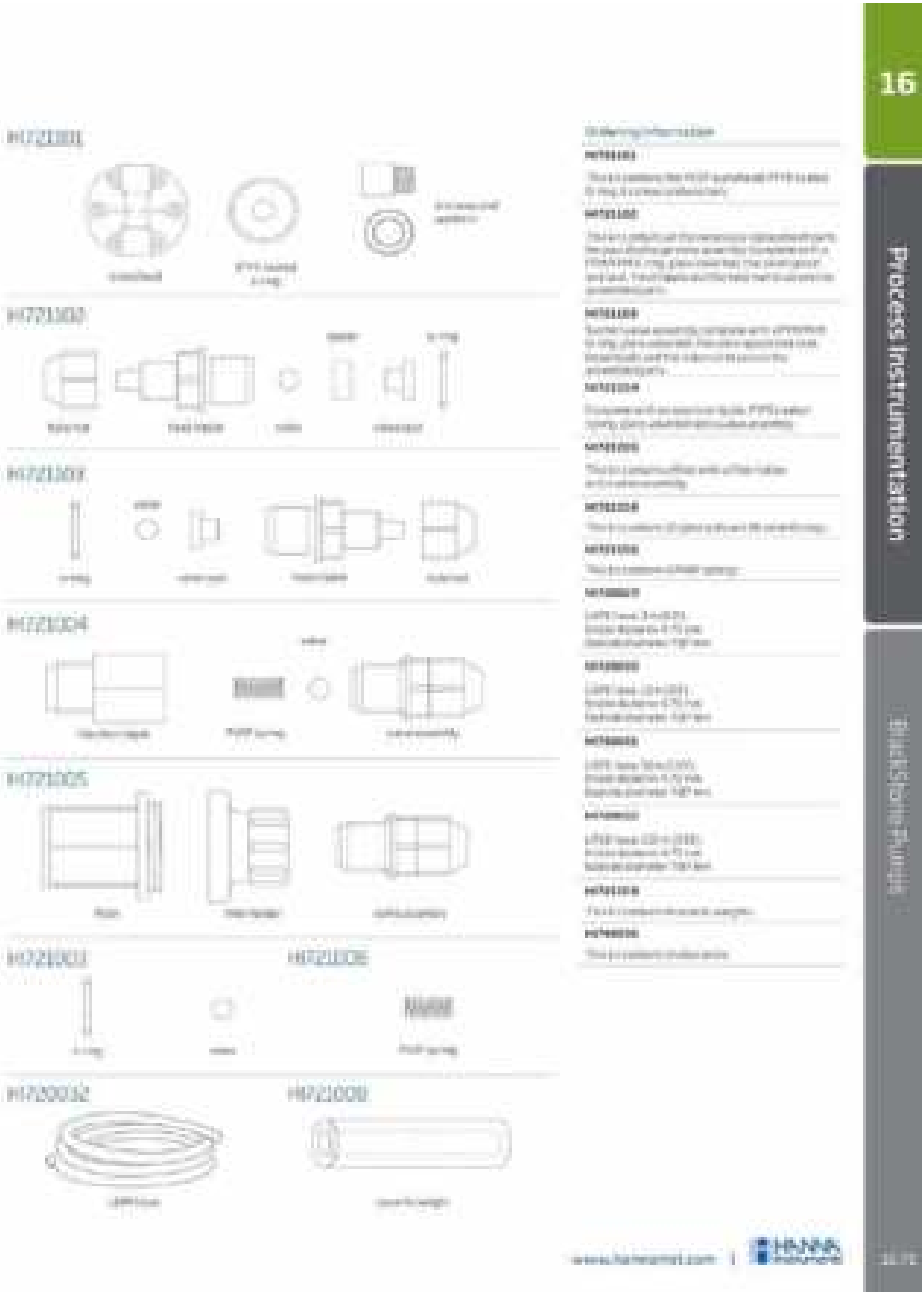


Mechanical Dimensions

for BlackStone Chemical Dosing Pumps







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Process Instrumentation

Process Electrodes

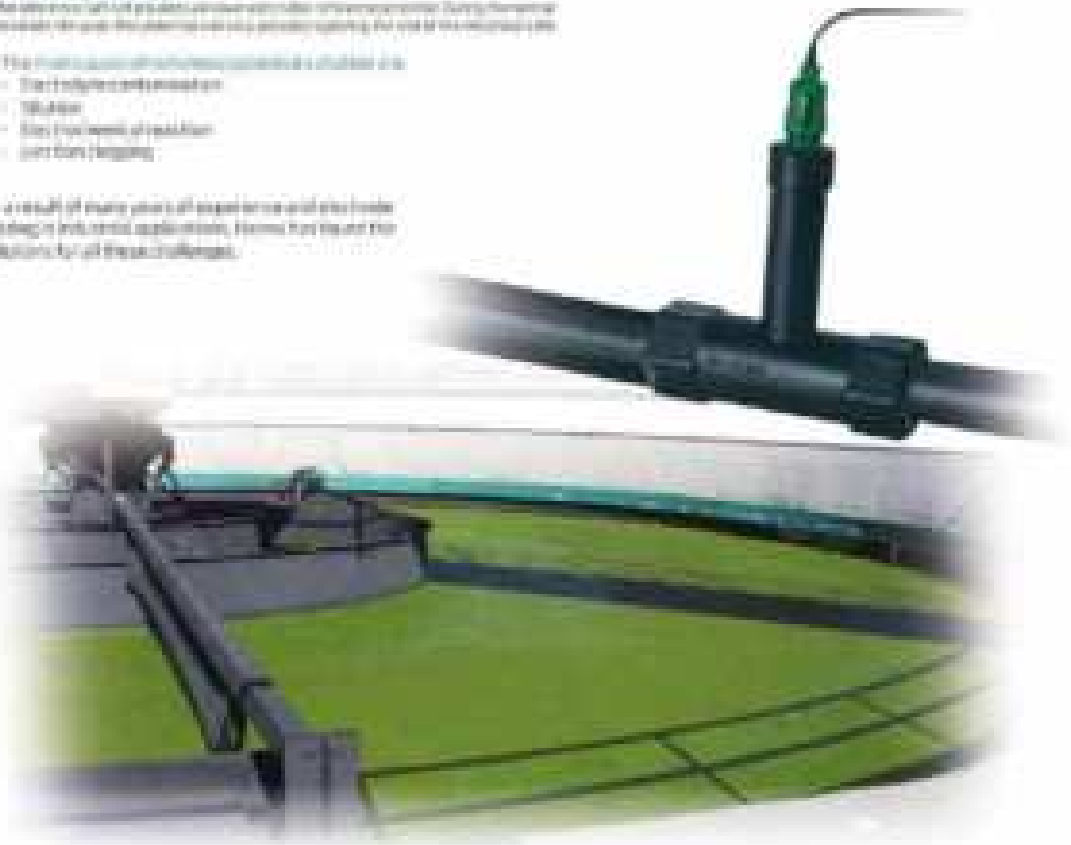
A Worldwide Leader in Electrode Manufacturing

Industrial Electrodes and Probes






Reference Half Cell



Electrolyte Contamination

Dilution

Electrochemical Reaction

Junction Clogging

Measurement Half Cell





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Process Instrumentation

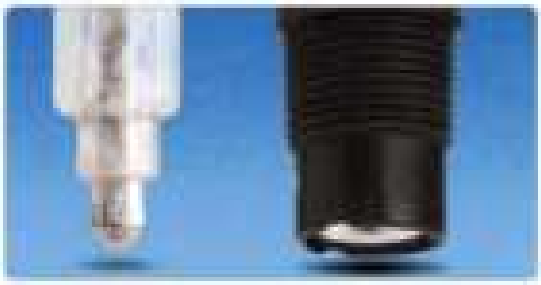
Process Electrodes

Built for Everyday Demanding Use

Glass Type	Applications	pH Range	Temperature Range
HT			
HT			
HT			

Mechanical Stress

Flat Tip Advantages





An exposed electrode surface will foul and require frequent cleaning

The flat shape of the electrode tip nearly eliminates deposits

Electrode Body Material Glass, PVDF or PEI



Glass



PVDF



PEI



Cable Leakage

Amphenol: Why and Where to Use It



Electrode-Cable Connection

Potential Matching Pin

Process Electrodes



Common Industrial Applications

Application	pH Electrode Series	Code

Flat Tip Industrial Electrodes



Select the flat tip electrode that best fits your process requirements by choosing from the following technical characteristics:

1. Junction

- Single junction ideal for wastewater analysis

2a. pH Electrodes

2b. ORP Electrodes

3. Temperature Sensor

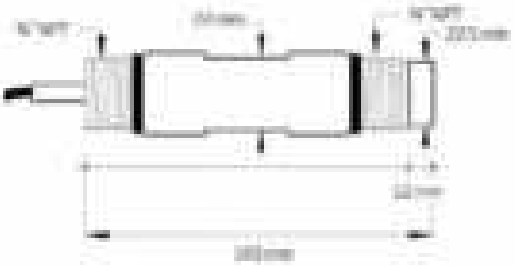
4. Connection Type

5. Built-in Amplifier

6. Cable Length

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Flat Tip Industrial pH Electrodes









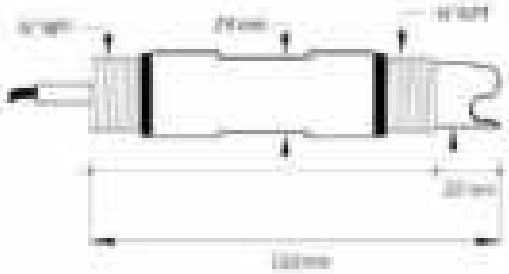


HI10 [ ] - [ ] [ ] [ ]

Flat Tip Industrial ORP Electrodes











HI20 [ ] - [ ] [ ] [ ]

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Process Instrumentation

AmpHel® Flat Tip Industrial Electrodes



AmpHel® Flat-tip pH Electrodes

General Purpose pH Electrodes

Low Temperature pH Electrodes

High Temperature pH Electrodes

pH Electrodes for Acid Samples with Fluoride (conc.[F- max 2 g/L, Temperature Max 50 °C, pH >2)

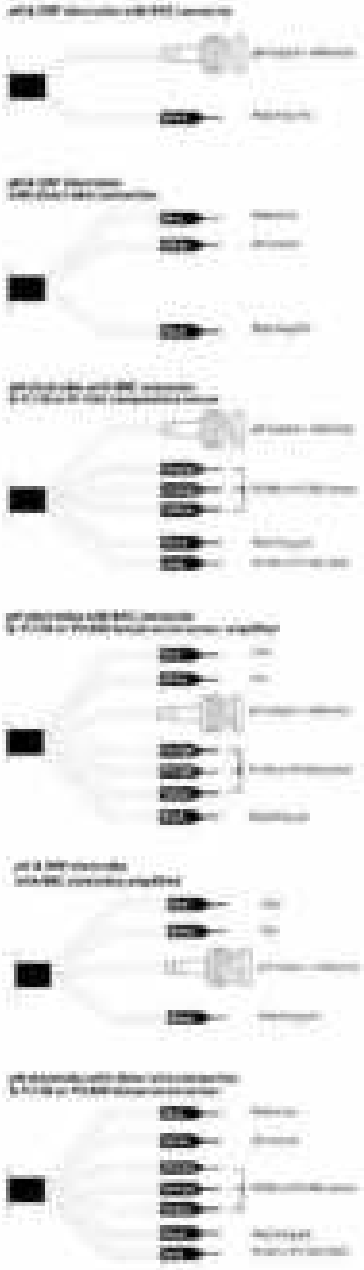
AmpHel® Flat-tip ORP Electrodes

Platinum Type ORP Sensors

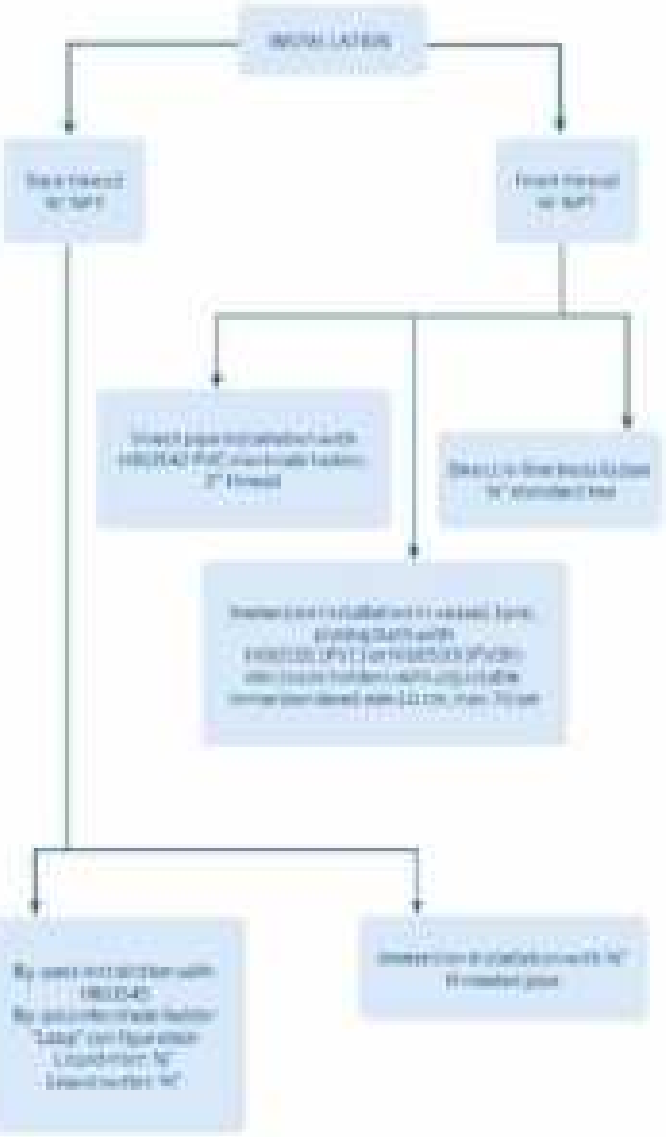
Gold Type ORP Sensors

Flat Tip Industrial Electrodes Electrical Connections and Installation

Electrical Connections



Installation



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Process Instrumentation

Amplified pH and ORP AmpHel® Electrodes

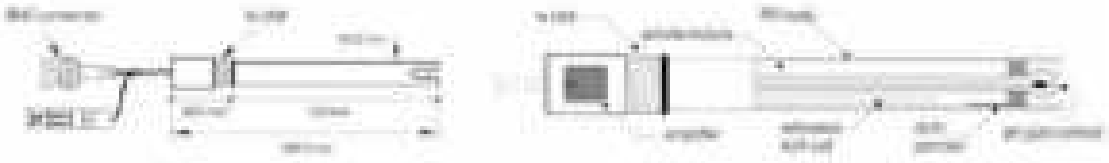




Easy installation



Amplified pH and ORP AmpHel® Electrodes



AmpHel® pH Electrodes with Replaceable Battery - General Purpose pH Electrodes

Code	Body	Junction	Electrolyte	Glass Type	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

AmpHel® pH Electrodes with Replaceable Battery - High Temperature pH Electrodes

Code	Body	Junction	Electrolyte	Glass Type	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



AmpHel® pH Electrodes with Internal Battery

Code	Body	Junction	Electrolyte	Glass Type	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

AmpHel® ORP Electrodes with Replaceable Battery

Code	Body	Junction	Electrolyte	Pt Type	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

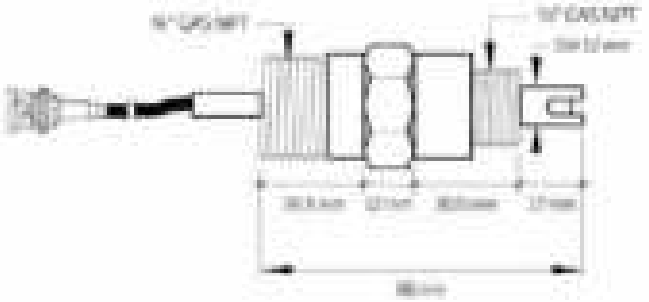
AmpHel® ORP Electrodes with Internal Battery

Code	Body	Junction	Electrolyte	Pt Type	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

pH and ORP Electrodes for Continuous Flow-thru Monitoring

Specifically Built for Industrial Applications



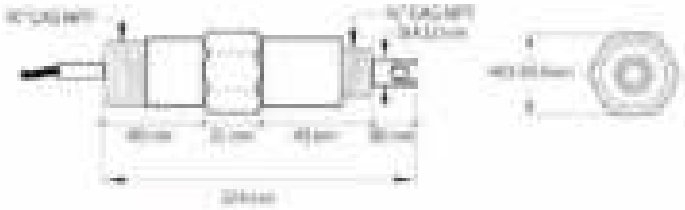




pH and ORP Electrodes for Continuous Flow-thru Monitoring

Specifically built for Industrial Applications



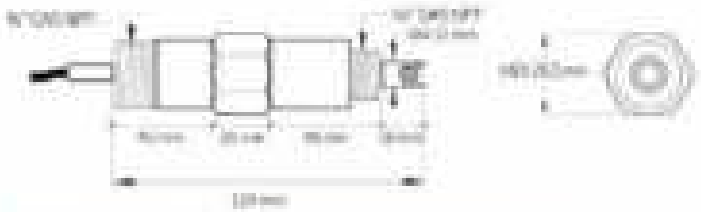




HI2000 Series pH Electrodes

Code	Junction	Electrolyte	Matching Pin	Amplifier	Temperature	Max Pressure	Connector	Cable
HI2001/1	double, PTFE	polymer	-	-	0 to 80°C / 0 to 176°F	3 bar (43 psi)	BNC	1m
HI2001/5	double, PTFE	polymer	-	-	0 to 80°C / 0 to 176°F	3 bar (43 psi)	BNC	5m
HI2001/10	double, PTFE	polymer	-	-	0 to 80°C	3 bar (43 psi)	BNC	10m
HI2001/1S	double, PTFE	polymer	yes	-	0 to 80°C / 0 to 176°F	3 bar (43 psi)	BNC	1m
HI2001/5	double, PTFE	polymer	yes	-	0 to 80°C / 0 to 176°F	3 bar (43 psi)	BNC	5m
HI2001/10	double, PTFE	polymer	yes	yes	0 to 80°C	3 bar (43 psi)	screw cap	10m







HI2000 Series ORP Electrodes with Platinum Sensor

Code	Junction	Electrolyte	Matching Pin	Amplifier	Temperature	Max Pressure	Connector	Cable
HI2003/1	double, PTFE	polymer	-	-	0 to 80°C	3 bar (43 psi)	BNC	1m
HI2003/5	double, PTFE	polymer	-	-	0 to 80°C	3 bar (43 psi)	BNC	5m
HI2003/1S	double, PTFE	polymer	yes	-	0 to 80°C	3 bar (43 psi)	BNC	1m
HI2003/5S	double, PTFE	polymer	yes	-	0 to 80°C	3 bar (43 psi)	BNC	5m

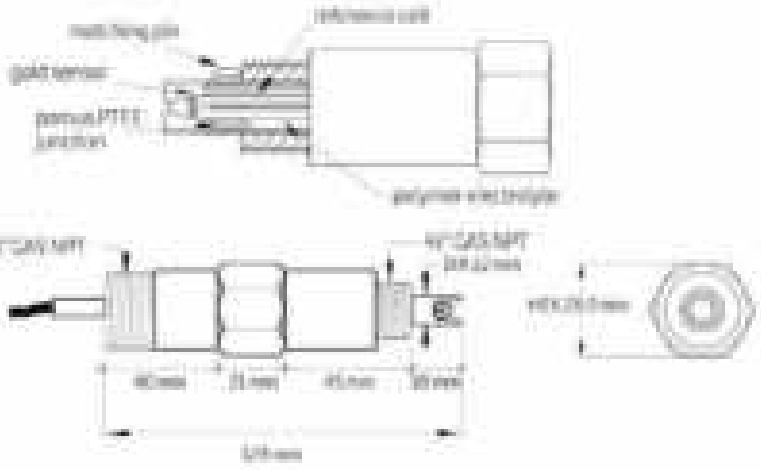
16

Process Instrumentation

pH and ORP Electrodes for Continuous Flow-thru Monitoring

Specifically Built for Industrial Applications

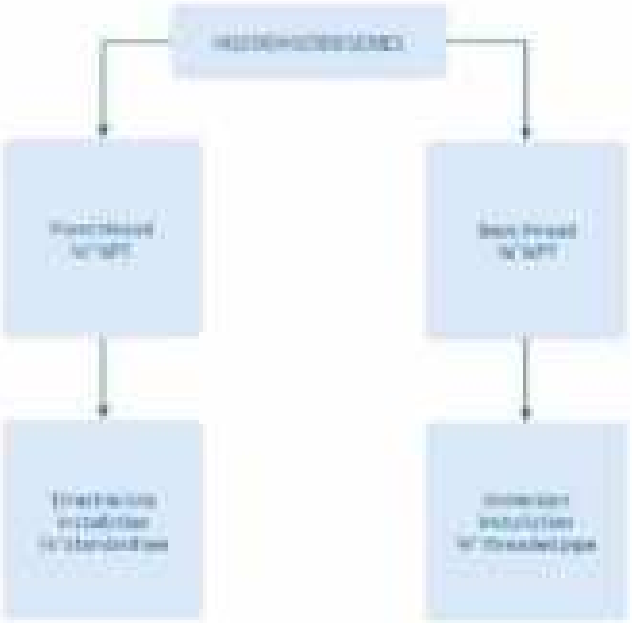




HI3000 Series ORP Electrodes with Gold Sensor

Code	Junction	Electrolyte	Reference	Amplifier	Temperature	Max Pressure	Connector	Cable
■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■

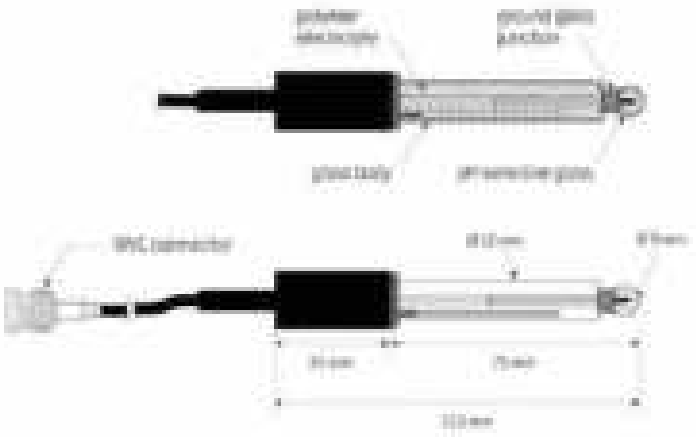
Installation

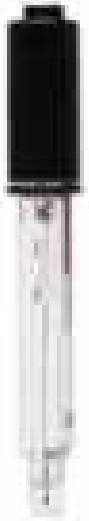


Easy pH and ORP Electrodes

with Quick and Easy BNC Connection







Combination Glass-body pH Electrode

Code	Description	Electrolyte	Temperature	Max Pressure	Connector	Cable
HI10000-5	double junction glass	polymer	0 to 80°C (32 to 176°F)	3 bar (43 psi)	BNC	1 m

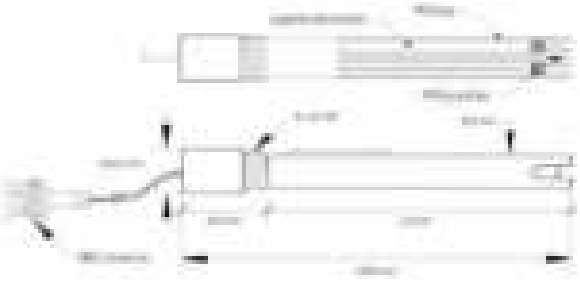
16

Process Instrumentation

Easy pH and ORP Electrodes

with Quick and Easy BNC Connection

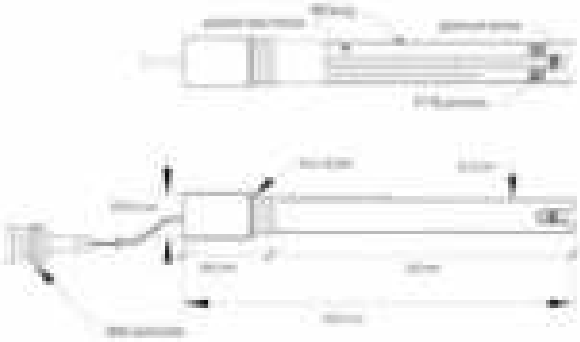




Combination PEI-body pH Electrode

Code	Junction	Electrolyte	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BNC	1m





Combination PEI-body ORP Electrode with Platinum Sensor

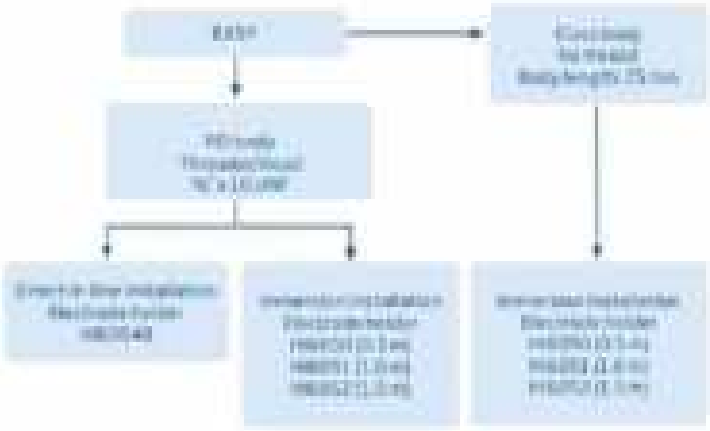
Code	Junction	Electrolyte	Temperature	Max Pressure	Connector	Cable
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BNC	1m
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BNC	1m

Installation

[illegible]

[illegible]

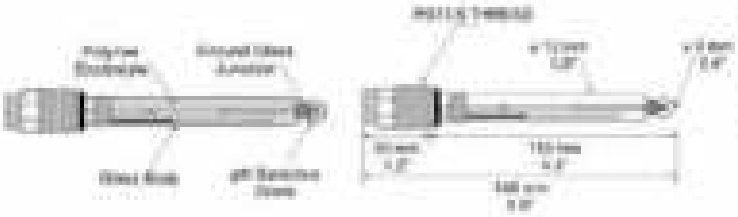
[illegible]



pH and ORP Electrodes

with T-type Connection





Combination Glass-body pH Electrode

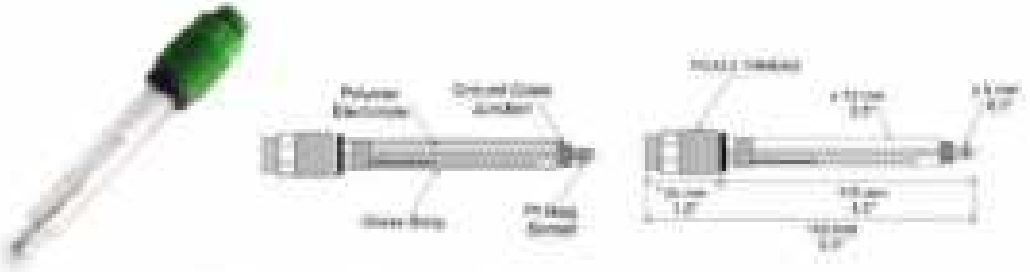
pH and ORP Electrodes

with T-type Connector



Combination PEI-body pH Electrode

Body	Junction	Electrolyte	Temperature	Max Pressure	Connector
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type



Combination Glass-body ORP Electrode with Platinum Sensor

Body	Junction	Electrolyte	Temperature	Max Pressure	Connector
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type



Combination PEI-body ORP Electrode with Platinum Sensor

Body	Junction	Electrolyte	Temperature	Max Pressure	Connector
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-type

pH and ORP Electrodes

with T-type Connection



Combination Glass-body ORP Electrode with Gold Sensor

Code	pH Stem	Electrolyte	Temperature	Max Pressure	Connector
HI80300	double PTFE	adaptive	0 to 80°C (32 to 176°F)	3 bar (43 Psi)	T-type
HI80700	single glass body	adaptive	0 to 80°C (32 to 176°F)	3 bar (43 Psi)	T-type

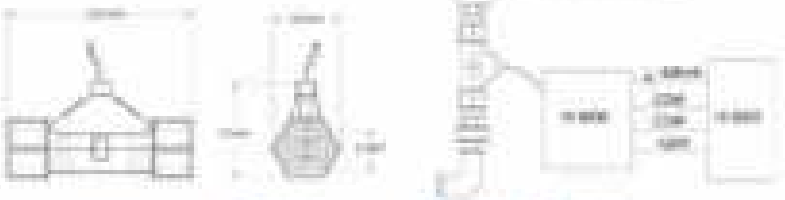
pH and ORP Immersion and In-Line Electrodes



Code	HI1131	HI1230	HI1053
Glass pH	combination pH glass bulb	in-line pH glass bulb	combination ORP platinum
Reference	double junction	double junction	double junction
pH Stem/Body	PTFE	PTFE	PTFE
Electrolyte	adaptive	adaptive	adaptive
Max Pressure	3 bar (43 Psi)	3 bar (43 Psi)	3 bar (43 Psi)
Range	pH 0 to 14	pH 0 to 14	pH 0 to 14
Recommended Operating Temp.	0 to 80°C (32 to 176°F)	0 to 80°C (32 to 176°F)	0 to 80°C (32 to 176°F)
Tip Shape	flat	flat	flat platinum
Temperature Sensor	no	no	no
Ag/AgCl Ref.	yes	yes	no
Body Material	PVC	PVC	PVC
Connector	BNC Female	BNC Female	BNC Female
Connection Cable	HI7632-00 adaptable with 5 m (16.4') cable	HI7632-00 adaptable with 5 m (16.4') cable	HI7632-00 adaptable with 5 m (16.4') cable
Recommended Use	general use	in-line	wastewater

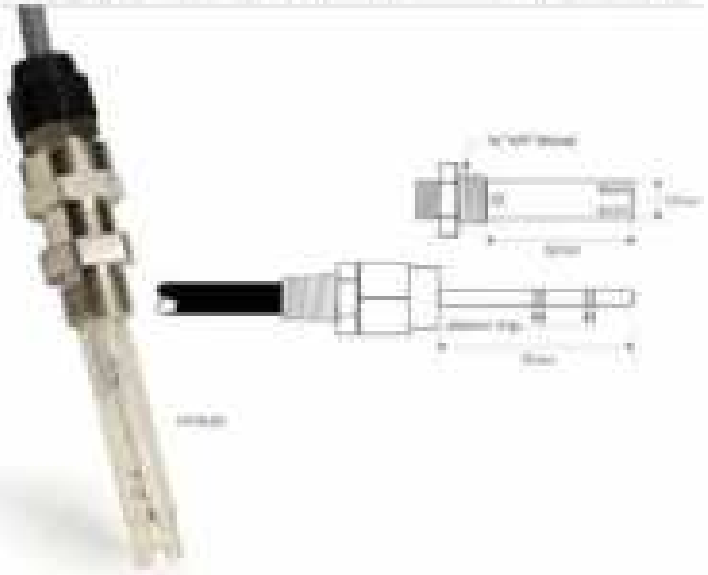
In-line Conductivity Probes





In-line Conductivity Probes

with Platinum Ring



Flow-thru Conductivity Probes



Submersion Probes

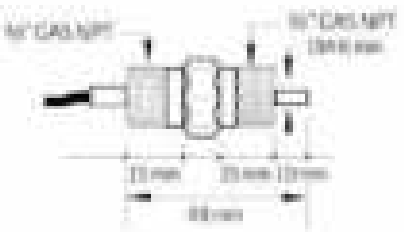


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Process Instrumentation

Stainless Steel Temperature Probes



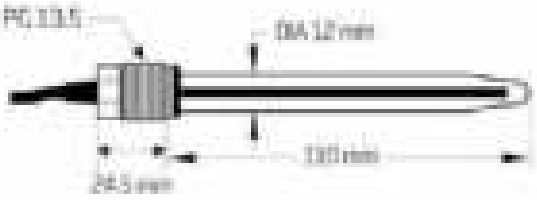


HI7610 and HI7611 Industrial Temperature Probes

Code	Temperature Sensor	Body	Max Pressure	Cable Length
HI7610				
HI7611				

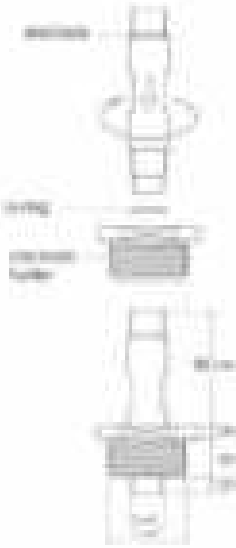
Glass Body Probes





HI7620 and HI7621 Industrial Temperature Probes

Code	Temperature Sensor	Body	Max Pressure	Cable Length
HI7620				
HI7621				





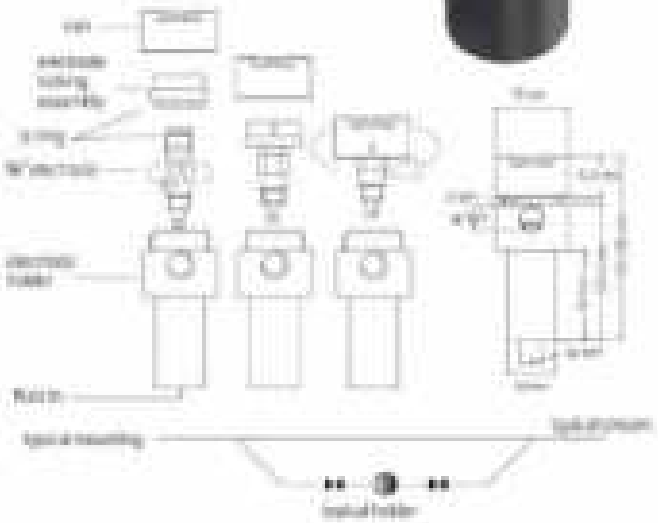
In-line Electrode Holder

for Direct Pipe Installation



By-pass Loop Electrode Holder

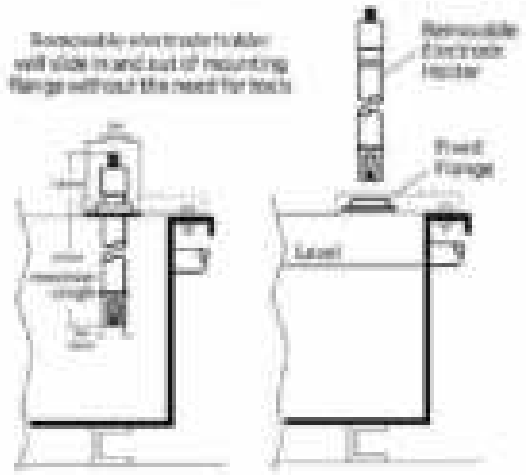
No Downtime



16

Process Instrumentation

Submersible Electrode Holder







Suggested dimensions of stainless steel mounting brackets to mount the flange onto the tank



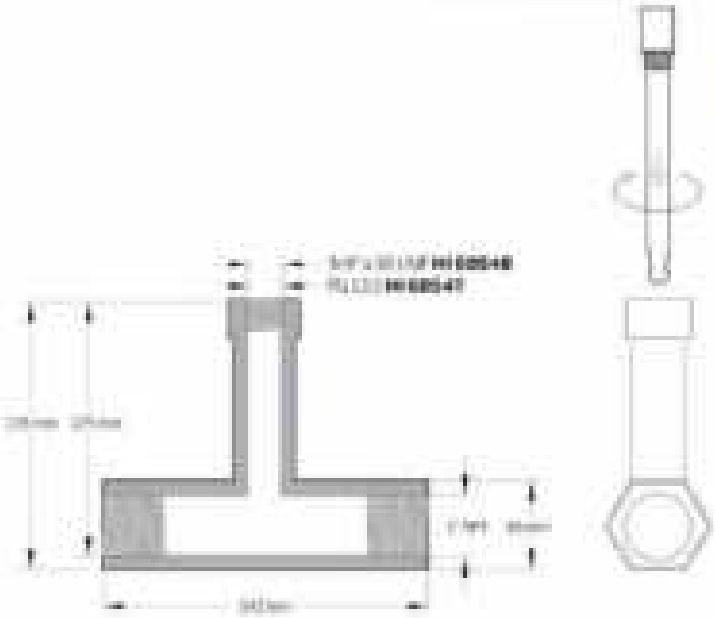


Specifications	Cable Length	Weight	Submersible Length
HI76313	10 m (33')	1 kg (2 lbs)	400 mm (15.7")
HI76313/1	20 m (66')	1.2 kg (2.6 lbs)	870 mm (34.4")
HI76313/2	30 m (98.5')	1.5 kg (3.3 lbs)	1200 mm (47")

Electrode Holders

for in-line Applications







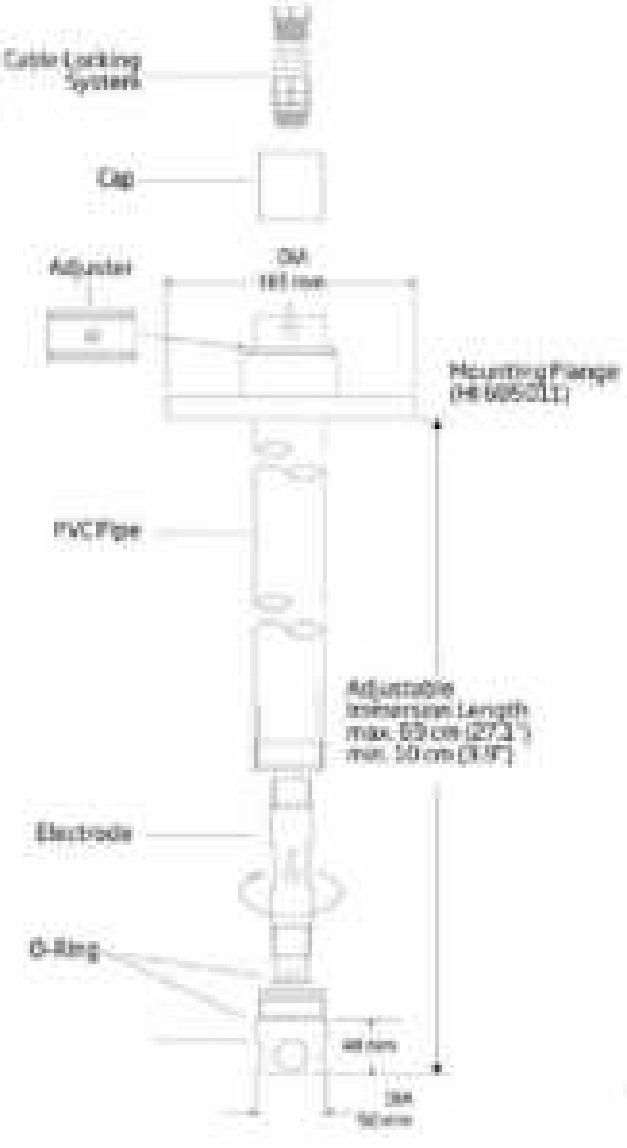


16

Process Instrumentation

Immersion Electrode Holders

for Tanks, Vessels, Baths and Open Channels



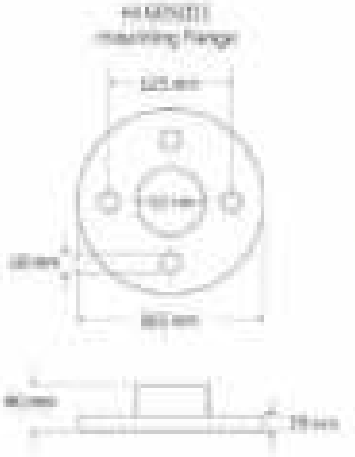


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Glossary 176

17 IP67 Protection

Glossary



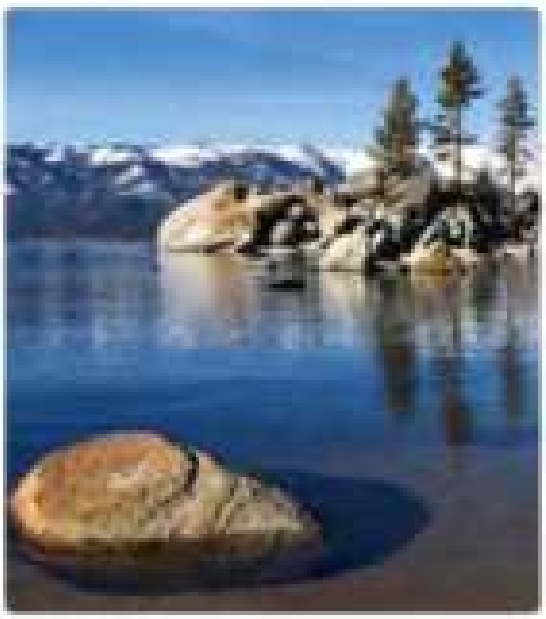
IP67: The Waterproof Advantage

Hanna waterproof meters comply with the IP67 standards that classify them dust-tight and protected against the effect of temporary immersion in water.

They enable the user to operate in the harshest of environments, protected against spills, dust, high humidity and severe weather conditions. This makes them ideal for outdoor measurements and in other areas subject to application such as mines, food processing, printing, laundries, etc. Hanna waterproof meters are built to last.







IP Codes

This standard (IEC) is a system for classifying the degree of protection provided by the enclosures of electrical equipment. Developed by the European Committee for Electrotechnical Standardization (CENELEC), these standards are designed to numerically rate various levels of protection that levels of protection is entitled to provide. By assigning a Protection number (code), the degree of protection of the product can be quickly and easily determined. In the IP67 code, for example, IP signifies International Protection (or, Ingress Protection), the first digit 6 indicates the level of protection from solid objects, and the second digit 7 denotes the level of protection from liquids. See the tables below for the details.

DEGREE OF PROTECTION (First Number in the Code)

First #	Description
0	No special protection
1	Protected against solid objects greater than 50 mm (accidental contact by hand) (e.g. a hand)
2	Protected against solid objects greater than 12 mm (accidental contact by hand) (e.g. fingers)
3	Protected against solid objects greater than 2.5 mm (access by tools) (e.g. wires, thick wire)
4	Protected against solid objects greater than 1.0 mm (access by tools) (e.g. wires, screws)
5	Protected against dust (complete protection against contact; ingress of dust is not entirely prevented, but dust shall not enter in a quantity sufficient to interfere with the satisfactory operation of the apparatus or to impair safety)
6	No ingress of dust; complete protection against contact

DEGREE OF PROTECTION FROM LIQUIDS (Second Number in the Code)

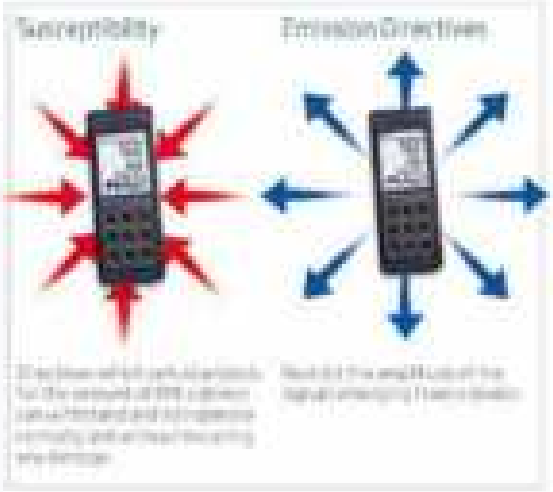
Second #	Description
0	Not protected
1	Protected against vertically falling water drops
2	Protected against vertically falling water drops when enclosure is tilted up to 15°
3	Protected against sprayed water
4	Protected against splashing water
5	Protected against water jets
6	Protected against powerful water jets
7	Protected against the effects of immersion between 15 cm and 1 m (duration of test = 30 minutes)
8	Protected against long periods of immersion under pressure (the meaning is specified by the manufacturer; normally, this means that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that it causes no damage)

CE Mark Definition and Compliance



Electromagnetic Interferences (EMI)

Electromagnetic Compatibility



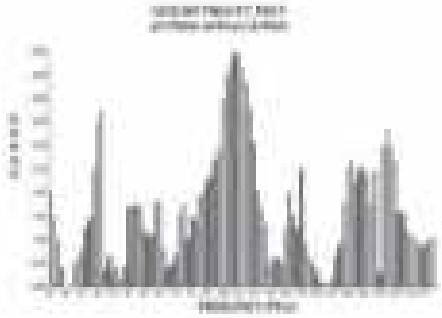








Hanna Meter Vs. Meter without CE







ISO 9001:2008 Compliance



ISO Standards

With Hanna, you receive products manufactured to the most stringent quality standards.

ABS

ABS/LAS

Absorbance

Accuracy

ADI

Alkalinity

Analytical Procedure

Arc/Spot®

AOAC

Aqua Dip™

ASBC

ASTM

ATC

Auto-feedback

Backlight

Backpack Lab®

"Baume"

BEPS

BNC Connector

Bayonet Neill-Concelman connector is a common type of radio frequency coaxial connector used for coaxial cable which connect to various devices usually is applied for frequencies below 3 GHz.

BOD

Biochemical Oxygen Demand (BOD) gives an indication of the biodegradable organic material present in a sample of water. The dissolved oxygen concentration is measured before and after an incubation period of 5 days and the BOD is calculated as mg/L from the difference.

% Brix

Degrees Brix is a unit of measurement of the sugar content of an aqueous solution. One degree Brix is equivalent to 1 gram of sucrose in 100 grams of solution (1% w/w).

°C

Unit of temperature degree Celsius (°C = (°F - 32) / 1.8)

CAL Check™

With the Hanna exclusive CAL Check validation function, users are able to verify the performance of their instrument at any time. Taking just a few short steps, the validation procedure is extremely user friendly and ensures that the meter is properly calibrated.

Calibration

Calibration is the validation of specific measurement techniques and equipment.

The basis is the difference between the reading of the instrument and the reference value. The procedure that establishes and corrects this basis is the calibration.

At the simplest level, calibration is a comparison between a measurement – one of known magnitude or correctness, made or set with one device and another measurement made in as similar a way as possible with a second device.

Calibration is often regarded as including the process of adjusting the output or display of a measurement instrument to agree with the value of the applied standard, within a specified accuracy.

CAL Check™ System

When used in tandem with a CAL Check™ meter, CAL Check™ equipped electrodes permit users to see if it's time to perform a proper calibration in the event of a dirty or broken electrode or contaminated buffer solution. The system alerts the user to either check the electrode, replace the buffer solution or both. The system also reminds users when the calibration should be performed.

Calibration Curve

In analytical chemistry, a calibration curve is a general method for determining the concentration of a substance in an unknown sample by comparing the unknown to a set of standard samples of known concentration. A calibration curve is one approach to the problem of instrument calibration; other approaches may mix the standards into the unknown, giving an internal standard.

The calibration curve is a plot of how the instrumental response, the so-called analytical signal, changes with the concentration of the analyte in the standard solutions. The concentrations of the standards must lie within the working range of the technique (typically linearity). Then, by using the chosen technique, a blank and a series of standard samples are measured. Many times, a sample of the analyte is added to a solvent and serially diluted, to create solutions of known concentration. Finally, the response of the unknown is measured, and using the calibration curve, the concentration of the analyte is known.

Candela

The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540 × 10¹² hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.

CE

CE mark

CE Mark

See page 214

17 Glossary

Glossary

Checker®

Checkfridge®

Checktemp®

CIE

Cleaning Solution

Clip-Lock™

COD

Colorimeter

Colorimetry

Conditioning Solution

CPC™

CTAC

°Dornic

Delrin

Detection Limit

Another consideration that affects the detection limit is the accuracy of the model used to predict concentration from the raw analytical signal. There are a number of different "detection limits" that are commonly used. These include the instrument detection limit (IDL), the method detection limit (MDL) and the limit of quantitation (LOQ).

Even when the same terminology is used, there can be differences in the LOD according to nuances of what definition is used and what type of noise can be tied to the measurement and calculation.

Most analytical instruments produce a signal even when only the matrix without any target analyte is present. This signal is referred to as the matrix blank.

The IDL is the analyte concentration that is required to produce a signal greater than three times the standard deviation of the matrix blank.

Many times, there is need for the analyte in a method that is just above a real limit of quantitation or above a regulatory limit. For example, it might be necessary to know if a sample that is to be acquired for a permit is greater than the EPA limit of 4.0 ppb for chloroform. The sample may require dilution or concentration prior to analysis to be consistent.

Additional steps in an analysis add additional opportunities for error.

Since detection limits are defined in terms of error, this will naturally increase the measured detection limit. The detection limit with all steps of the analysis included is called the PQL.

Dew Point

The dew point is defined as the temperature to which air must be cooled in order for condensation (saturation) to occur. The dew point is dependent on the absolute quantity of water vapor present, and therefore, the moisture in the air.

DIN Connector

A circular connector for consumer electronics originally standardized by the German Institute for Normung (DIN) for analog audio signals.

Direct Potentiometry

Direct Potentiometry is a widely used method of performing an analysis with ISEs. This method is highly effective when the user must quickly measure large batches of samples at varying concentrations. Users store standard solutions such as the HI 5004 and HI 5005 stock solutions of the unknown sample by an electrode (after calibrating the instrument with fresh or more standards, ionic strength adjustments are made to both samples and standards). In some applications, a temperature probe is used. Taking samples back to the laboratory.

DIST®

Hanna Dissolved Solids Tester) are widely used for monitoring EC/TDS in water conditioning, reverse osmosis, cooling towers, drinking water, wastewater, laboratories, agriculture, aquaculture and coastlines, hydroponics and the petroleum industry.

DO1

Dissolved carbonate bearing, in terms of alkalinity (ppm = 0.05 meq/L = 2.8 mg/L CaCO3).

DO

Dissolved Oxygen. A relative measure of the amount of oxygen that is dissolved or carried in a given medium.

DPD

N,N-diethyl-p-phenylenediamine.

EBC

European Brewery Convention.

EC

Electrical conductivity is a measure of how well a material accommodates the transport of electric charge. Its SI derived unit is the siemens per meter (S/m). In practical water testing, it is the ratio of the current density to the electric field strength. It is applied also to the electrolytic conductivity of a fluid.

EDTA

Edetic acid or ethylenediaminetetraacetic acid.

17 Glossary

Glossary

IDS

Electromagnetic Compatibility

See page 014

Electromagnetic Interferences (EMI)

See page 014

EPA (U.S. EPA)

FAU

Fast Tracker™ Tag Identification System

FDA

Filling Solution

FNU

FTU

FS (or FL)

Glass Membrane

GLP

GP Class

GPS

Global Positioning System

GR

HγT

HACCP

HC

HF Glass

High Input Impedance Meter

HOLD Function

HPLC

HR

HT Glass

HVAC

Hygrometer

IARC

iButton® Tags

ICUMSA

17 Glossary

Glossary

Incremental Method

JTU

Jackson Turbidity Unit.

KFT

KHT

NTU

pH

SA

SE

ISO Standards

ISOPOTENTIAL pH

ISS

ITS

Junction

KF

NTW

Nitrate

LCD

Liquid Crystal Display

LDL Cholesterol

LED

LI

Linearity

LDAEL

LR

LSD

LT Glass

Luz (lx)

Matching Pin

MEADOS

MESAR

mg/L

Minerals

Millennial pH Buffer

MR

MTC

mV

NIST

nm

NaTC

17 Glossary

Glossary

NPK

Nitrogen, phosphorous, and potassium.

NPT

National Pipe Thread, (U.S.) standard for tapered threads used on threaded pipes and fittings.

NTU

Nephelometric Turbidity Unit.

°Oechsle (°Oe)

°Oechsle is mainly used in the German, Swiss and Luxemburgish wheat-growing industry to measure the sugar content of must. The °Oe is (i.e. one degree Oechsle corresponds to one part of difference between the mass of one liter of must at 20°C and 1 kg (the mass of 1 liter of water at room temperature).

Open junction

This type junction is unique because built-into it is the reference half-cell. It flows a very slow rate which comes into direct contact with the solution to be measured. A challenge is of an open junction is the contact resistance which is normally more stable to clog.

Opto-isolator

An opto-isolator, or opto-coupler is an electronic device designed to transfer electrical signals by utilizing light waves to provide optical coupling with electrical isolation between input and output.

ORP

Oxidation Reduction Potential. Solutions exchange electrons inhibiting or reducing. Based on measurement of ORP in mV.

OSHA

The Occupational Safety and Health Administration.

OUR

Oxygen Uptake Rate. Used to determine the oxygen consumption or respiration rate, by measuring mg of oxygen consumed per liter per hour.

PAN

1-(2-pyridylazo)-2-naphthol indicator.

PCU

Platinum Cobalt Unit.

PD Controller

Proportional Derivative controller.

PID

Polyurethane.

PSIA

Standards for the weight and velocity of exposure to certain elements.

Pfund Scale

The Pfund scale is a color system used to provide a reading of the color of honey in colors. There are seven color classifications for processed honey, water white, extra white, white, extra light amber, light amber, amber and dark amber. Traditionally the Pfund color grader works by visually comparing a sample of honey (placed in an optical glass cell) to a set of calibrated glass wedges.

pH [NIST]

The negative logarithm of the hydrogen ion activity has been given the symbol pH. The original definition was in terms of hydrogen ion concentration. The pH value (also known as pH) is associated with the "effective" concentration of hydrogen ions.

pH Glass fiber trode [SURFC]

Hydrogen ion responsive electrode usually consists of a bulb, or other suitable formed special glass either fused to a stem of high-resistance glass, complete with internal reference element and internal filling solution system. Other geometrical forms may be employed for special applications.

Photometer

An instrument used for measuring the amount of a substance by means of a photoelectric cell.

PID Controller

Proportional-Integral-Derivative controller.

PLC

Potentiometric Titration

Pre-amplified Electrode

Precision

pSn

pSTI

pSX

PTFE

PVC

PVDF

PWT

QC

Range

17 Glossary

Glossary

Glossary

RDT

Resistance Temperature Detectors

Reference Electrode

Refractive Index

Repeatability

Reproducibility

Resistivity

RH

Robustness

rpm

RS

RS232

RS485

Salt

Salinity

SAR

Surface Absorbance Rate (mg/L)

Sensor Check™

°SH

SHT

SMART electrode

SOP

SOUR

SPDT relay

Specificity

Speedstir™

SPST Relay

SWI

Storage Solution

TDS

TDS Factor

TFFC

TDA

Total Dissolved Solids - A measure of the amount of solids (cations (hydrogen, aluminum, iron and manganese) present in soil. It is expressed in milligrams/liter or parts per million (ppm) (1 ppm = 1 mg/L).

°Th

Degree Thörner is concentration of a solution 10 mL sample diluted with water to a volume of deionized or distilled water to 0.1 M sodium hydroxide titrated until the pH is 8.4 endpoint.

Time Function

Sets the time for an operation to continue before a reading is displayed. This feature ensures consistency in measurements.

TPTZ

2,4,6-tri(2-pyridyl)-1,3,5-triazine (an indicator)

Traceability (NIST)

Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties. The concept is often expressed by the adjective traceable. The unbroken chain of comparisons is also called a traceability chain.

Turbidity

Turbidity of water is an optical property in which scattered light is measured and described, rather than transmitted. The scattering of the light that passes through a liquid is primarily caused by the suspended solids. The higher the turbidity, the greater the amount of scattered light. Because even the molecules in a very pure fluid scatter light to a certain degree, no solution is without some turbidity.

UPW

Ultra Pure Water.

USB

Universal Serial Bus is a specification to establish communication between devices and a host or master (usually a PC).

USDA

United States Department of Agriculture

USP

US Pharmacopeia. USP <645> with Stage 1, 2 and 3 compliance is required for purified water and WFI (water for injection). Hanna offers instruments that are able to perform all three stages required by this standard. Typical Hanna requirements are Resolution of 0.1 µS/cm or better, accuracy of 1 % of reading, long stability to avoid drift, without automatic temperature compensation, the cell constant be known with an uncertainty better than ±3%.

UV

Ultraviolet - electromagnetic radiation with a wavelength shorter than that of visible light but longer than X-rays (10–400 nm).

VCD

Voltage Controlled Oscillator.

VIS

The visible spectrum - is the portion of the electromagnetic spectrum that is visible (can be detected by) to the human eye (380 - 760 nm for typical human vision).

WHO

World Health Organization

Equilibrium Relative Humidity

Relative humidity in air as a function of temperature of some saturated salt solutions

Temperature (°C)	Lithium Chloride	Potassium Acetate	Magnesium Chloride	Potassium Carbonate	Magnesium Nitrate
0					
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
55					
60					
65					
70					
75					
80					
85					
90					
95					
100					

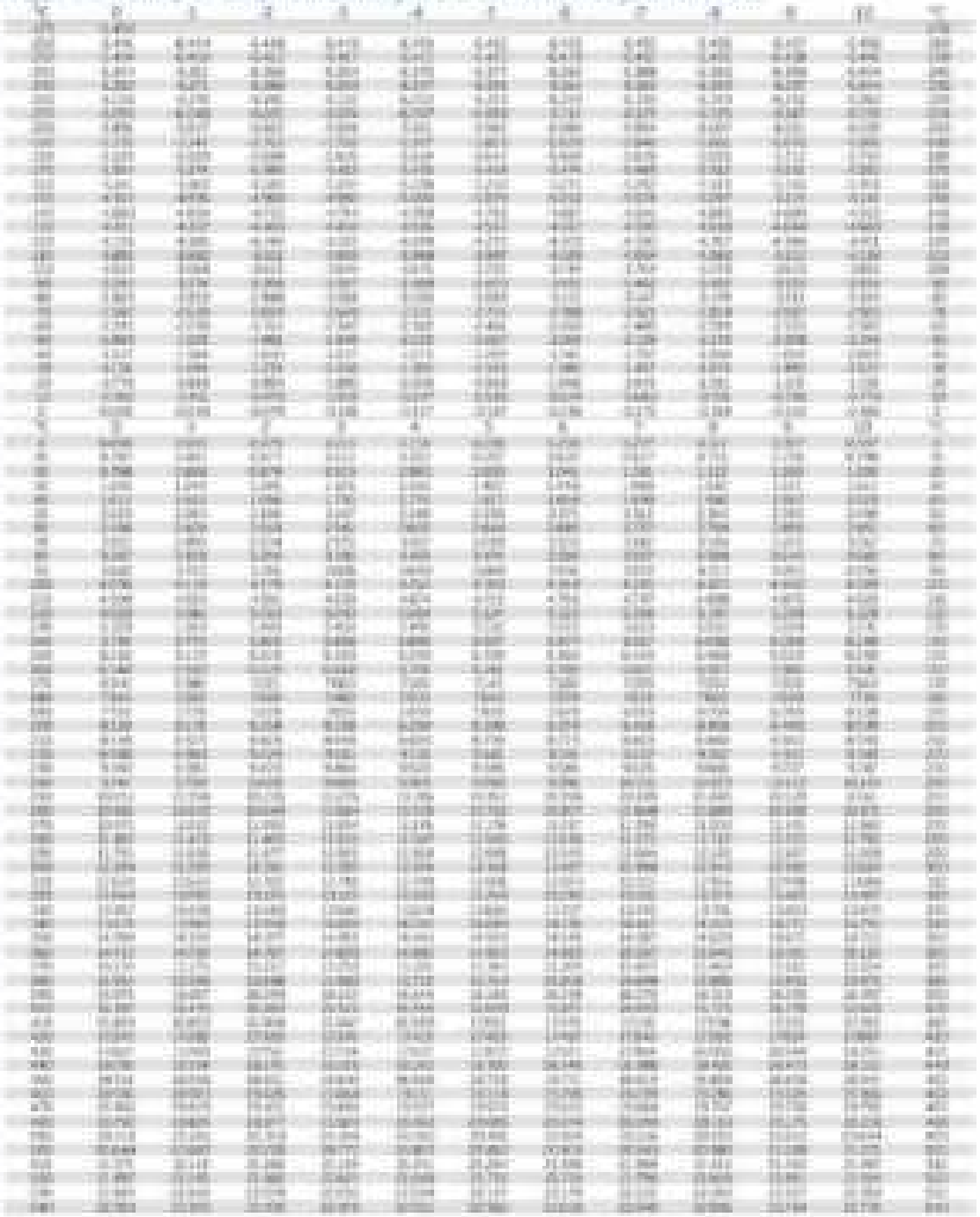
Relative humidity in air as a function of temperature of some saturated salt solutions

Temperature (°C)	Sodium Chloride	Potassium Chloride	Potassium Nitrate	Potassium Sulfate
0				
5				
10				
15				
20				
25				
30				
35				
40				
45				
50				
55				
60				
65				
70				
75				
80				
85				
90				
95				
100				

Thermocouple reading conversions

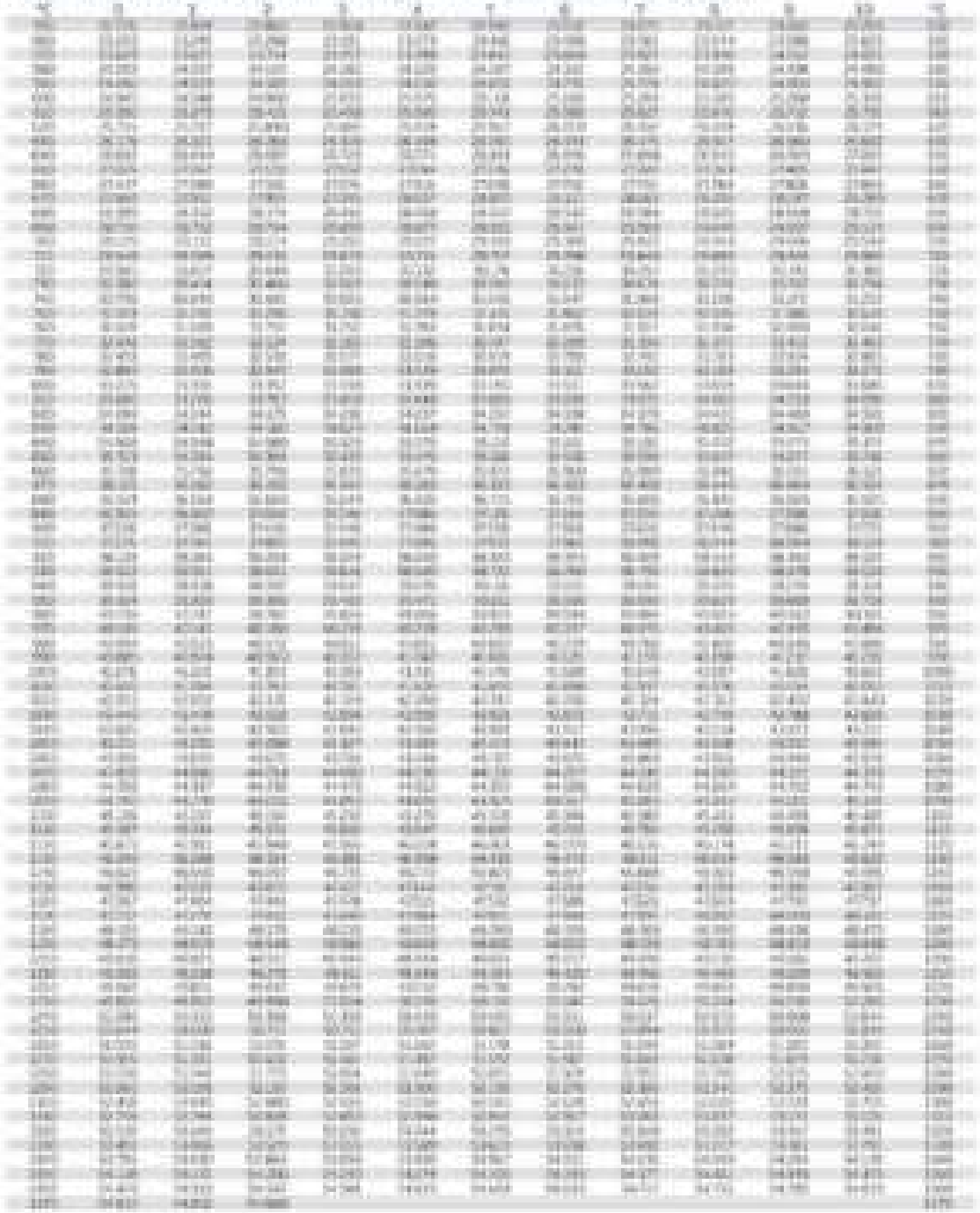
Thermocouple Reference Tables

K-type thermocouple - Temperature in degrees °C with reference junction at 0°C



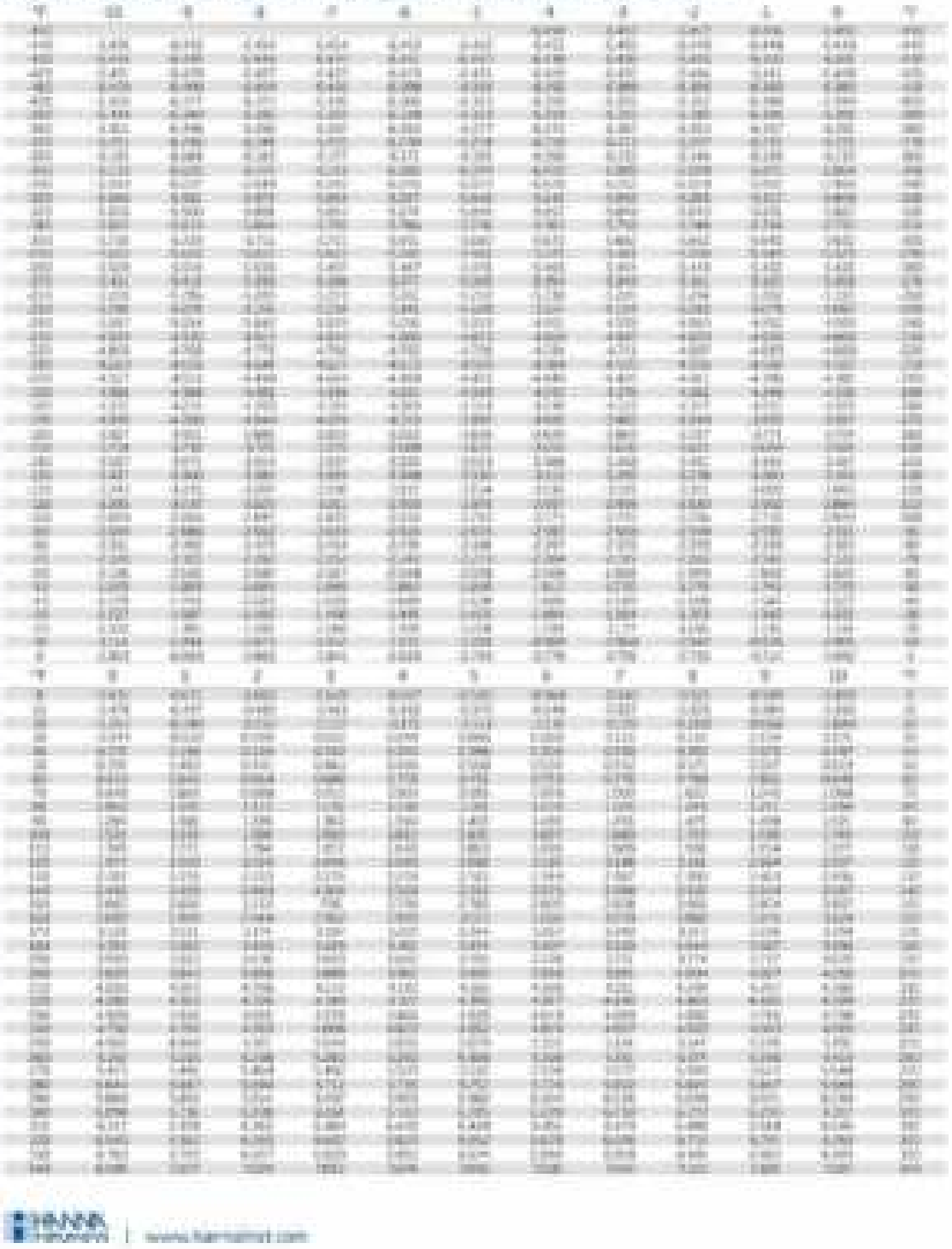
Thermocouple Reference Tables

K type thermocouple - Temperature in degrees °C with reference junction at 0°C



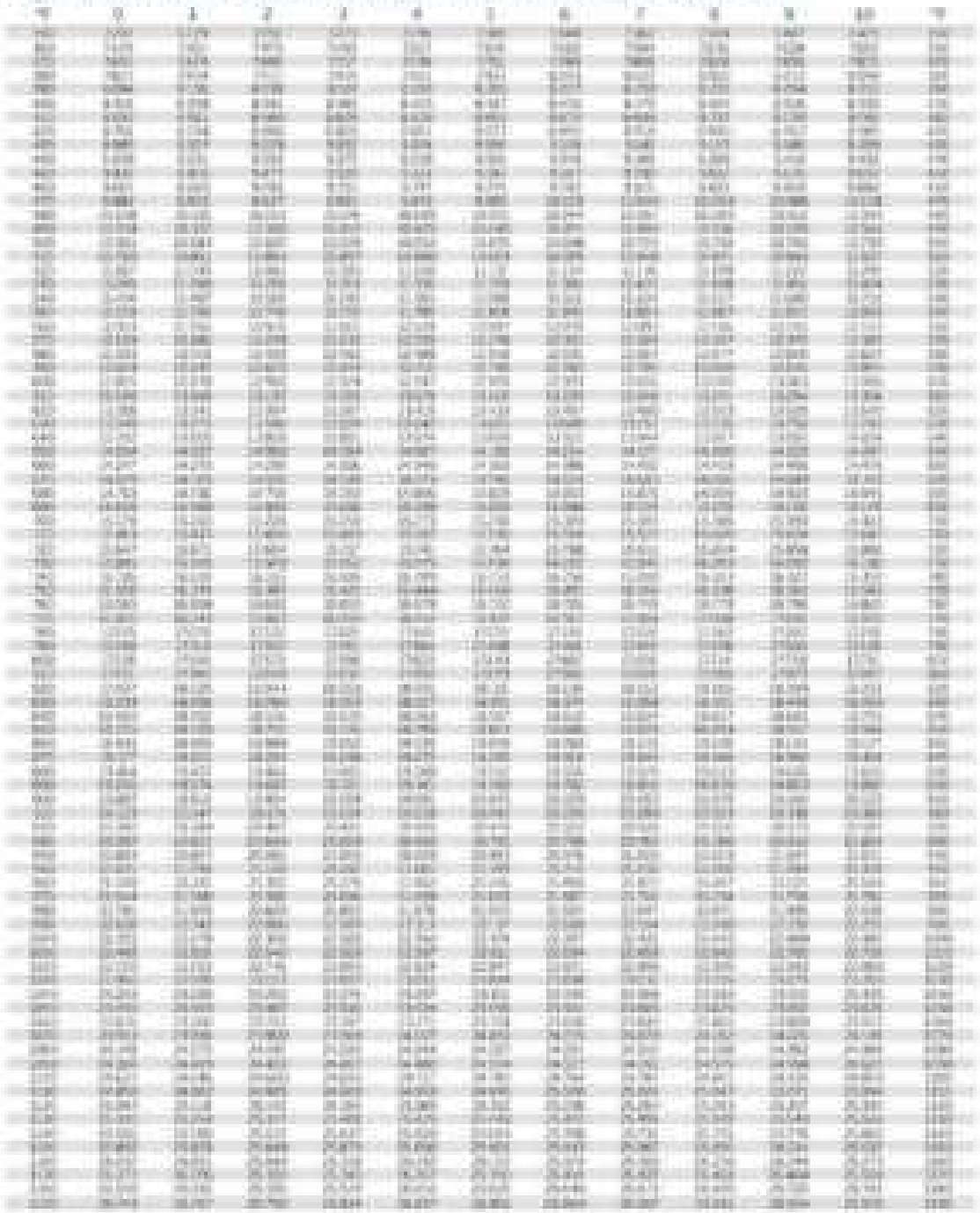
Thermocouple Reference Tables

K-type thermocouple - Temperature in degrees °F with reference junction at 32°F



Thermocouple Reference Tables

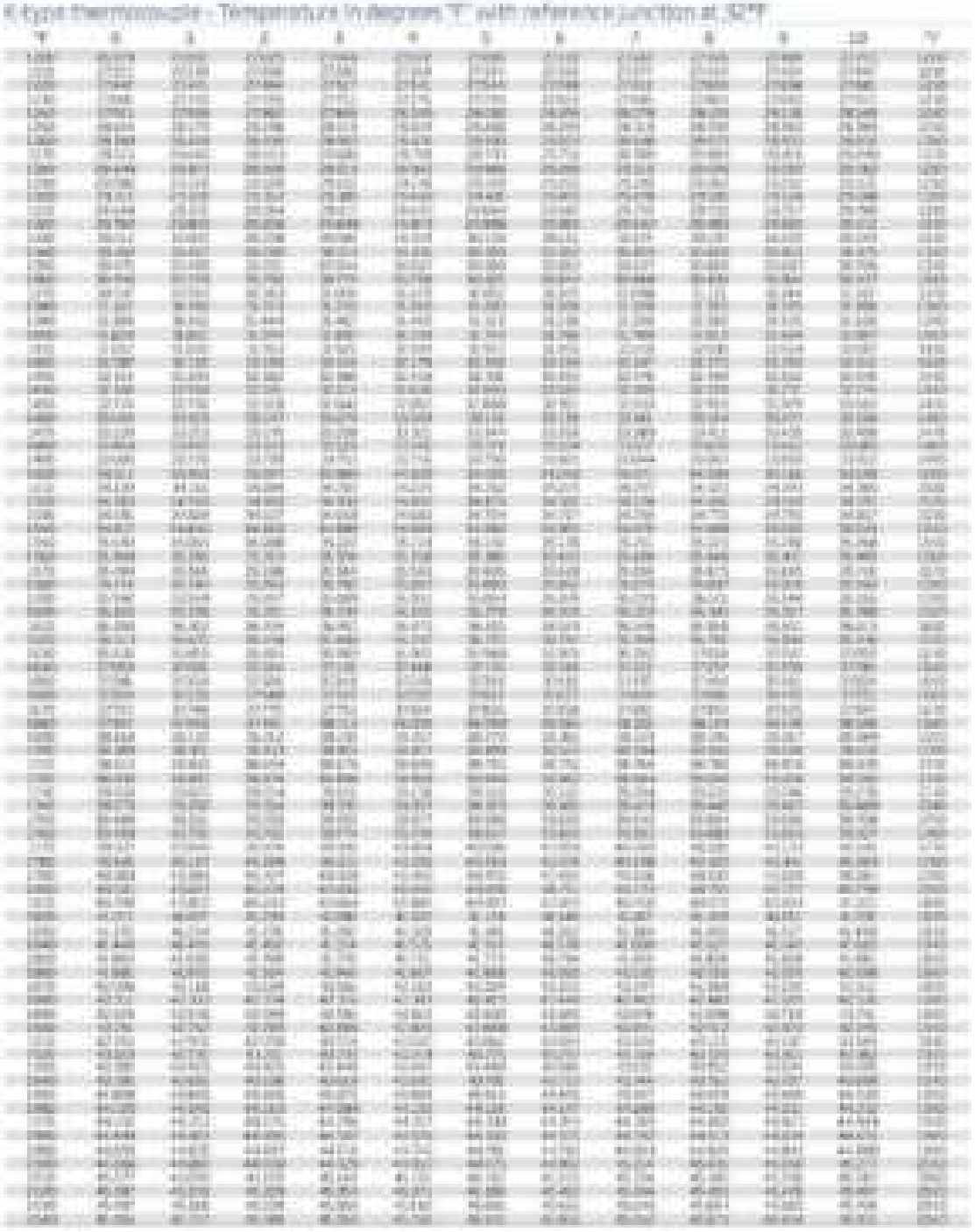
K type thermocouple - Temperature in degrees °F with reference junction at 32°F



Thermocouple readings as reference

Thermocouple Reference Tables

K-type thermocouple - Temperature in degrees °F with reference junction at 32°F



Thermocouple Reference Tables

K type thermocouple - Temperature in degrees °F with reference junction at 32°F

°F	0	1	2	3	4	5	6	7	8	9	10	11



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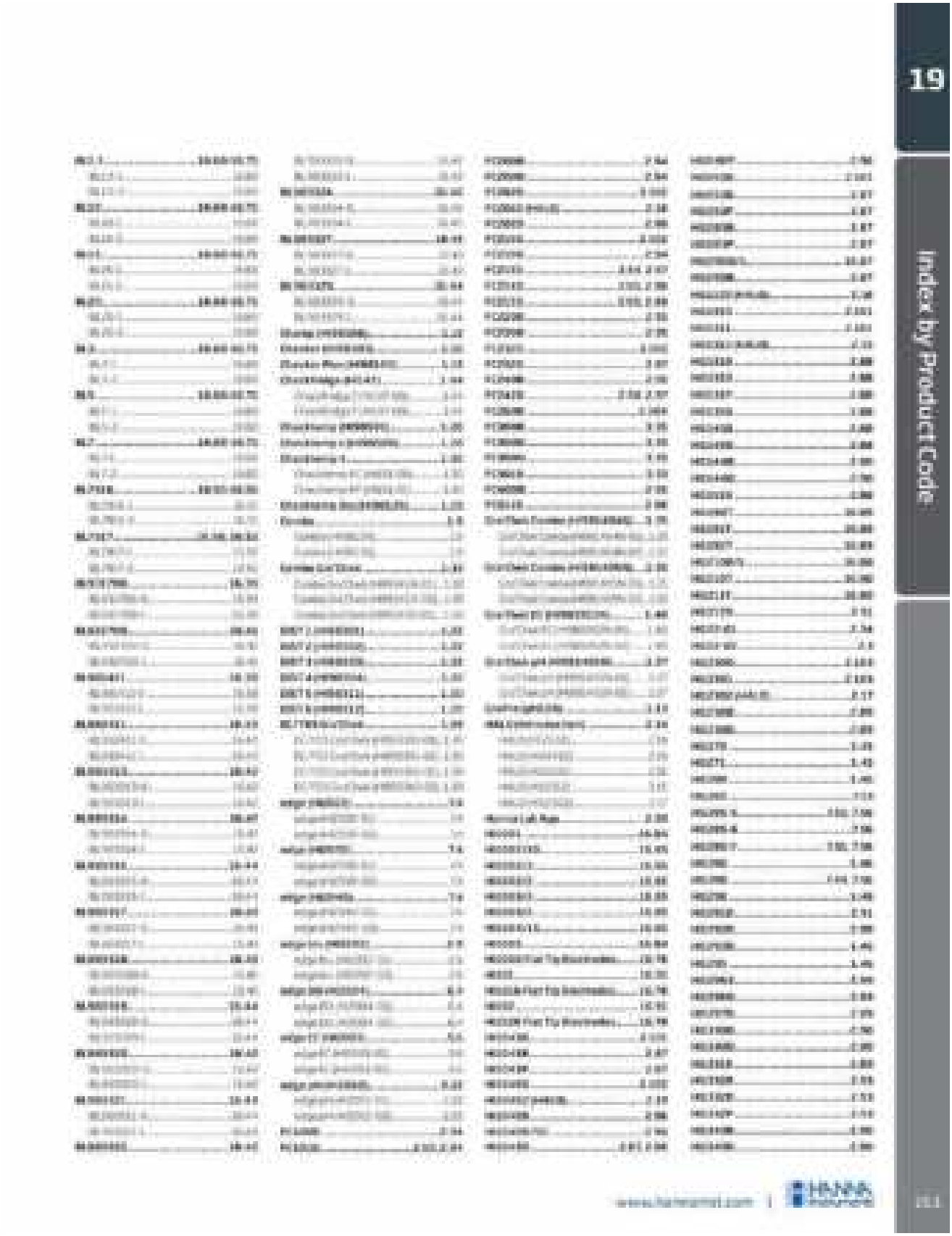


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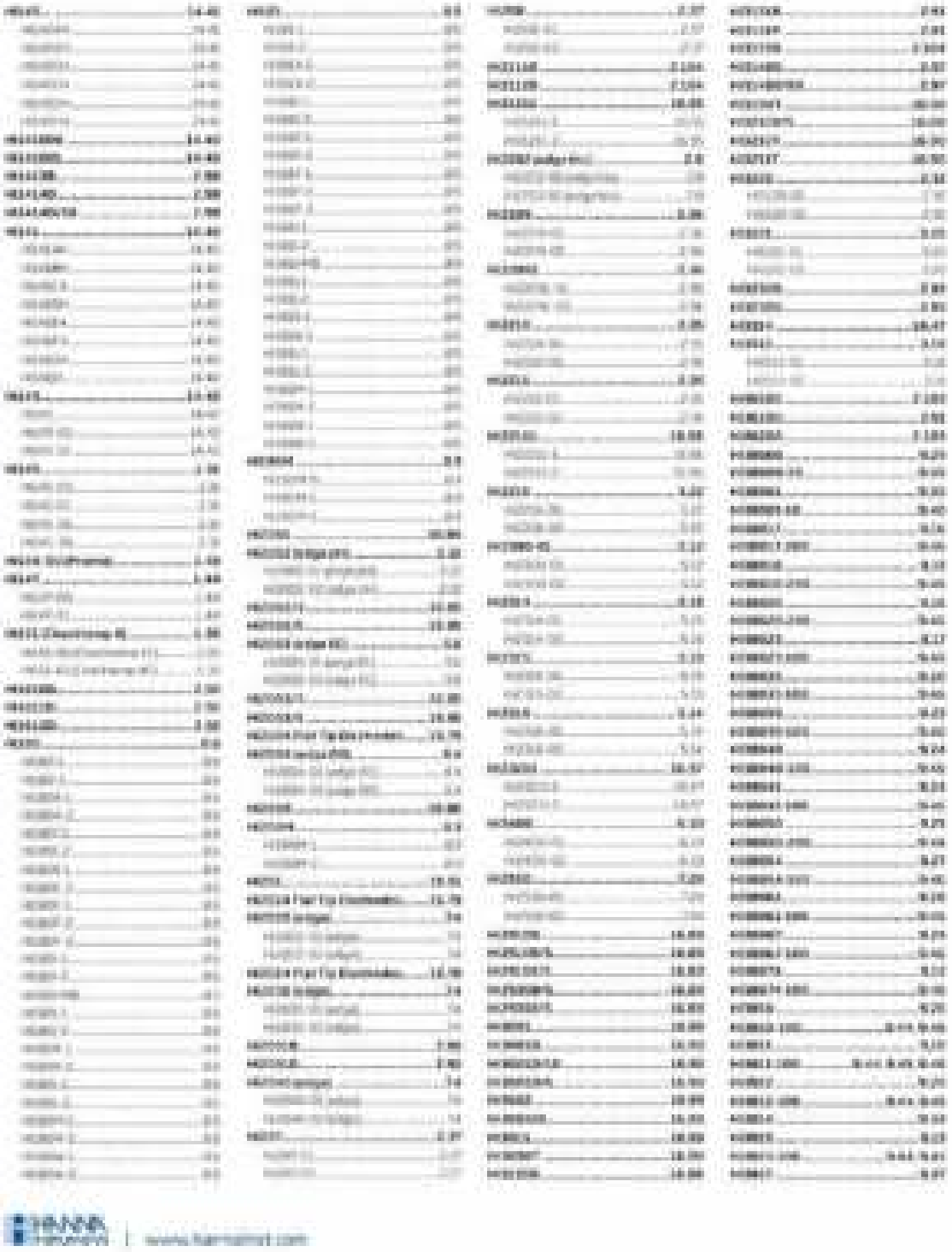


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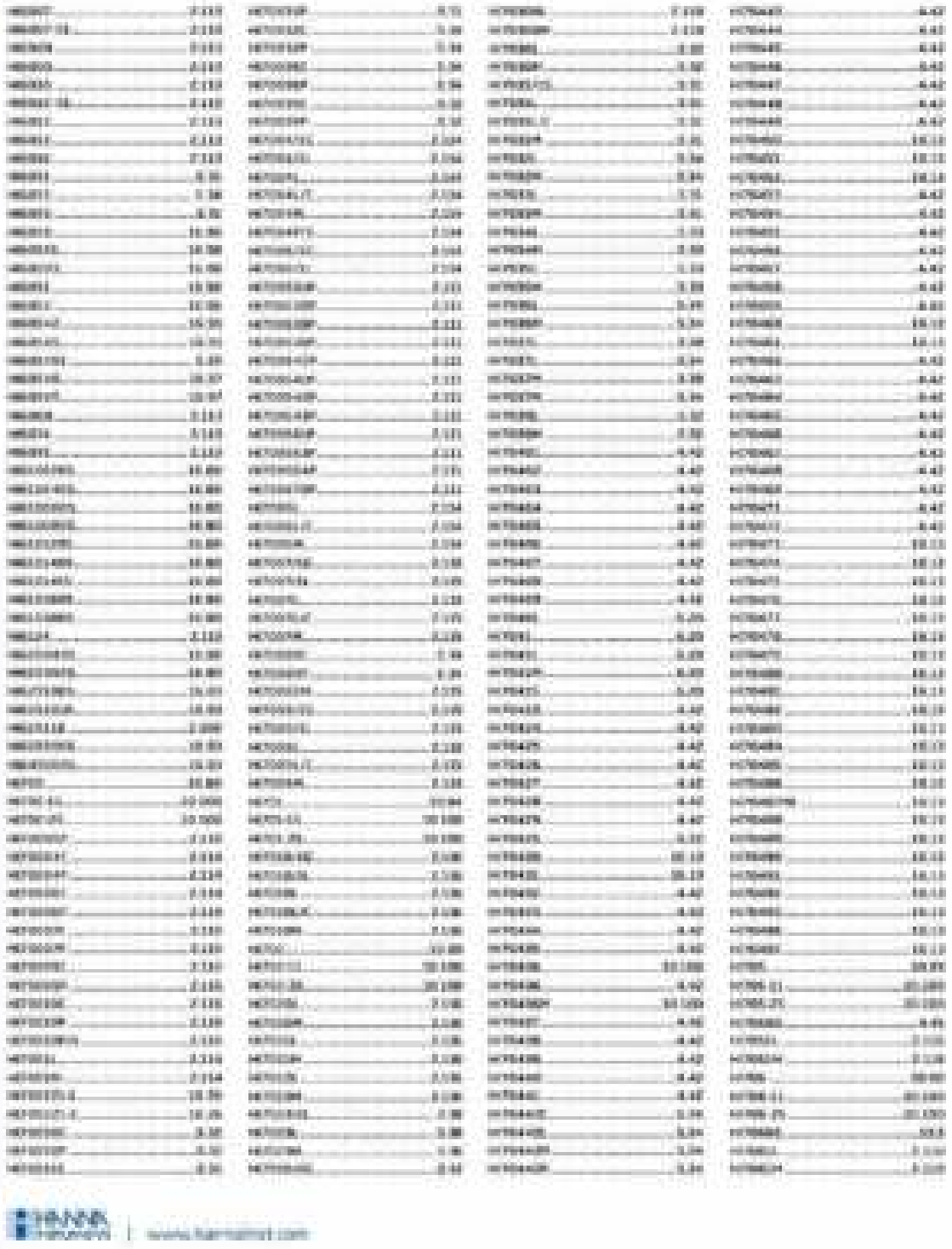

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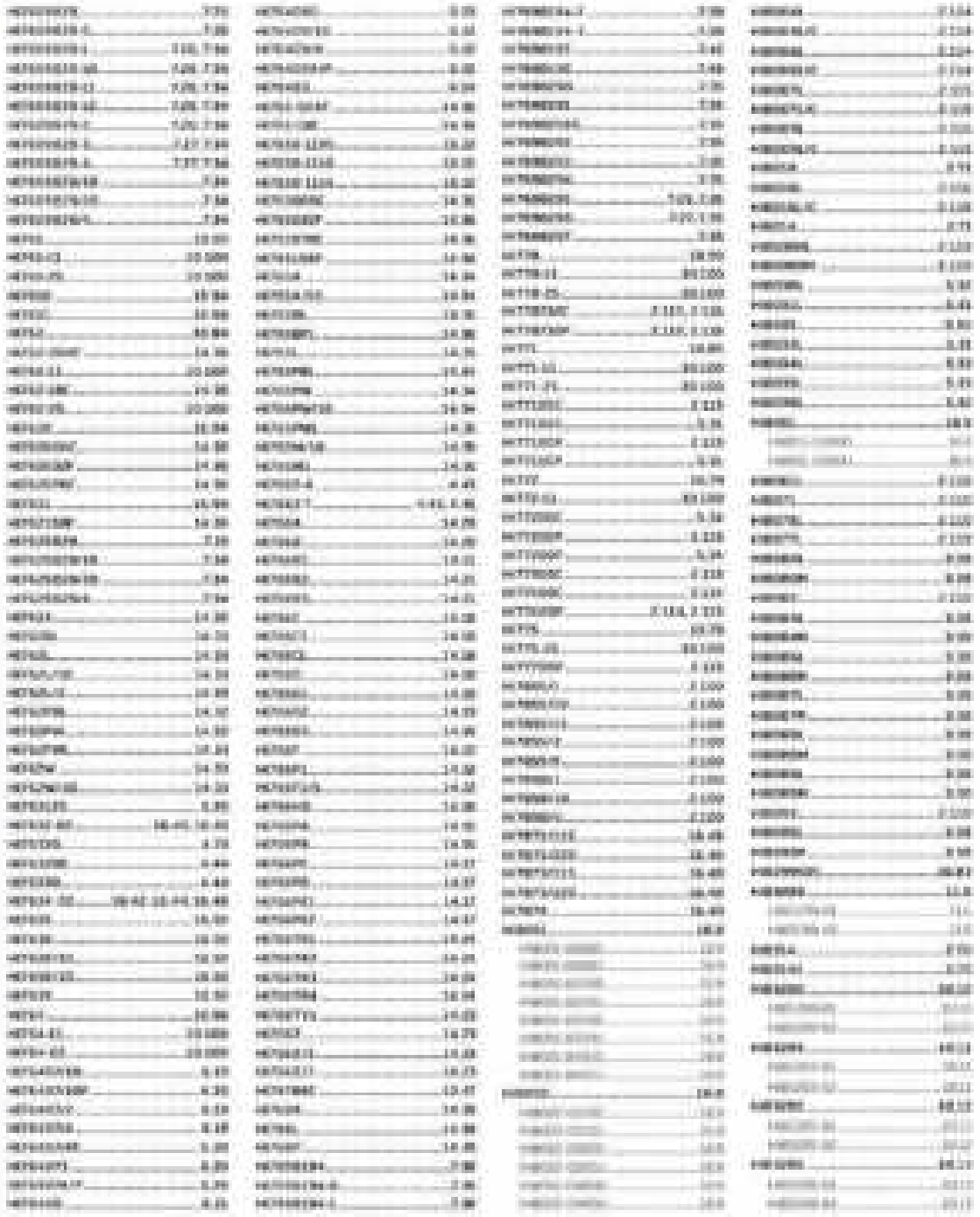
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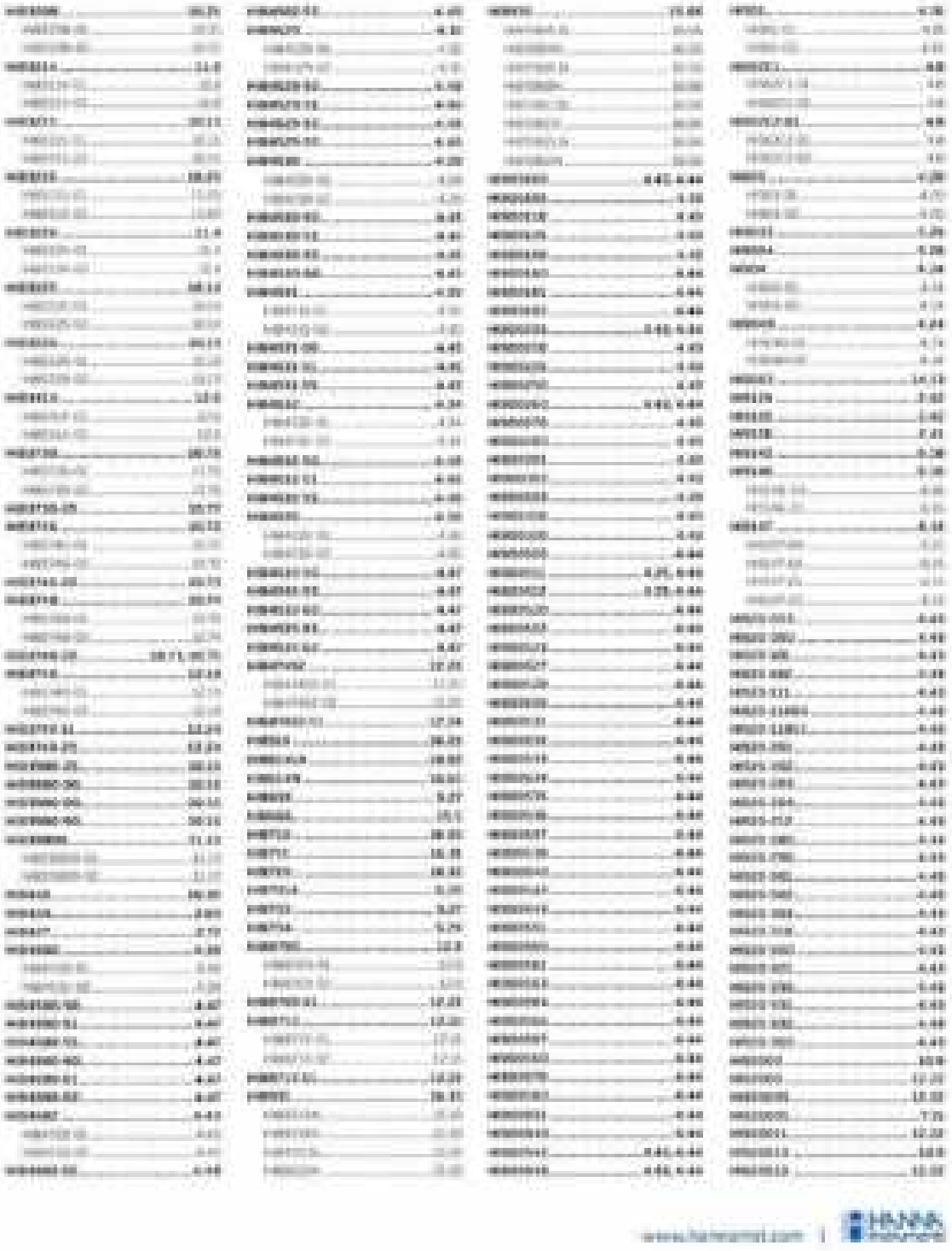


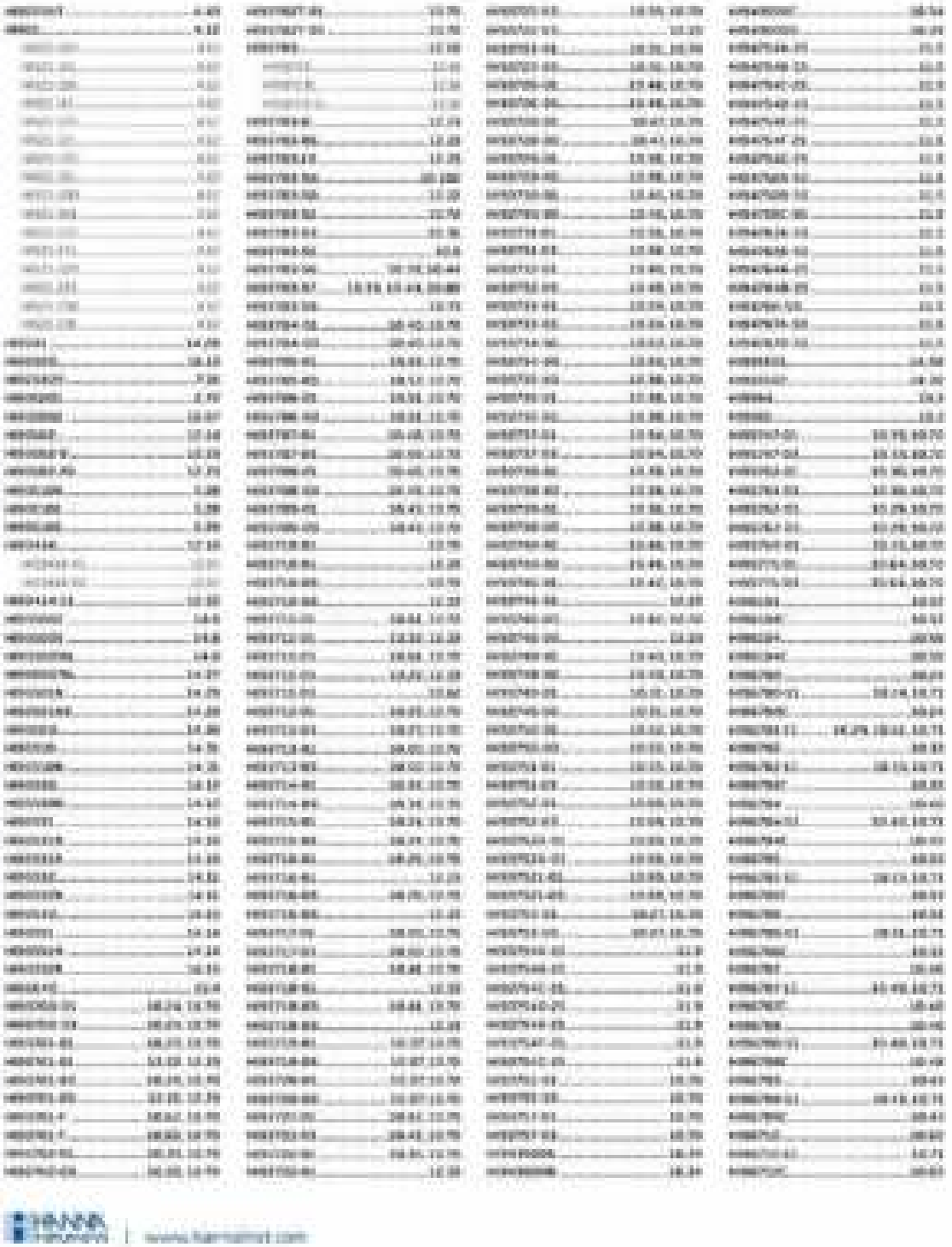

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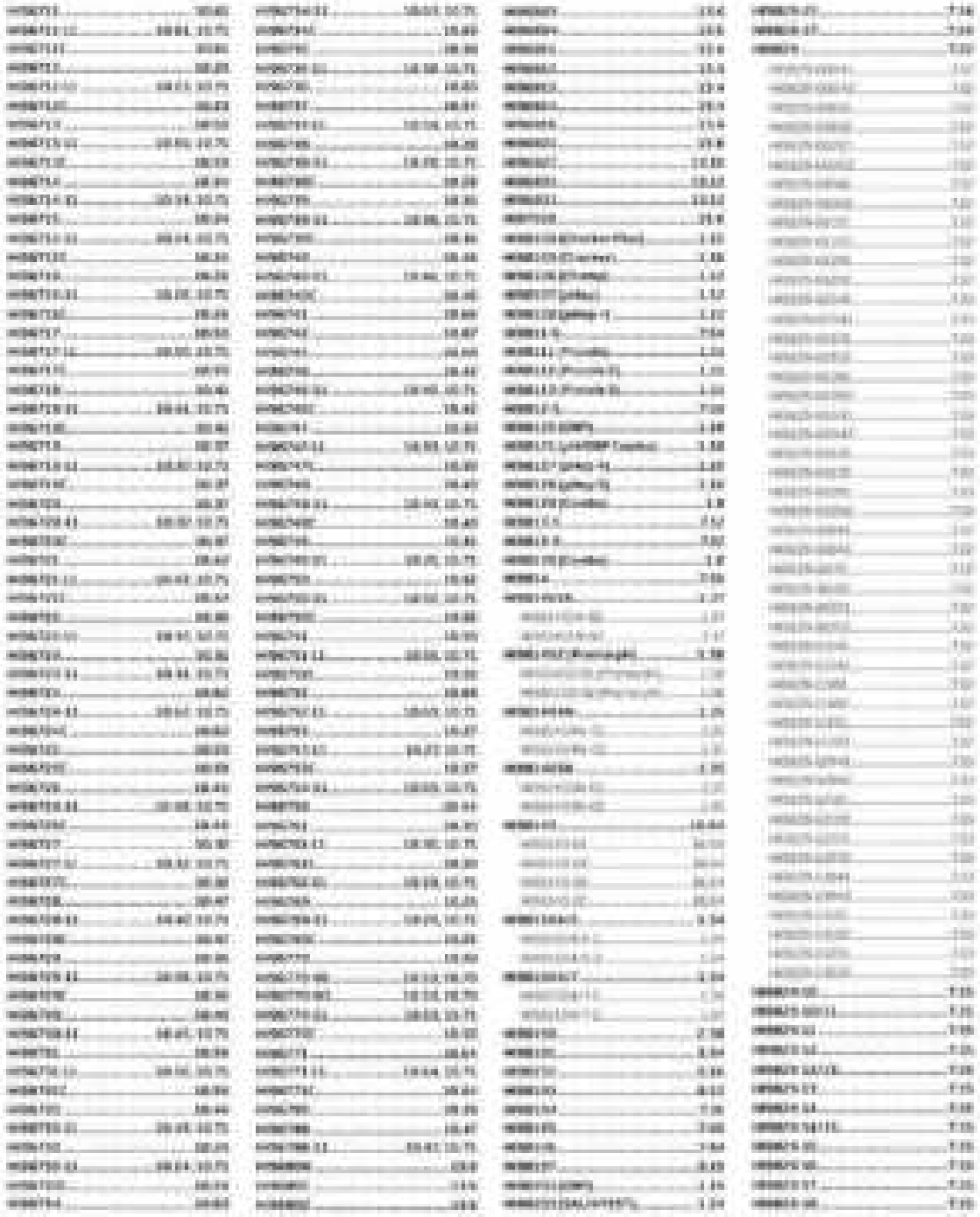


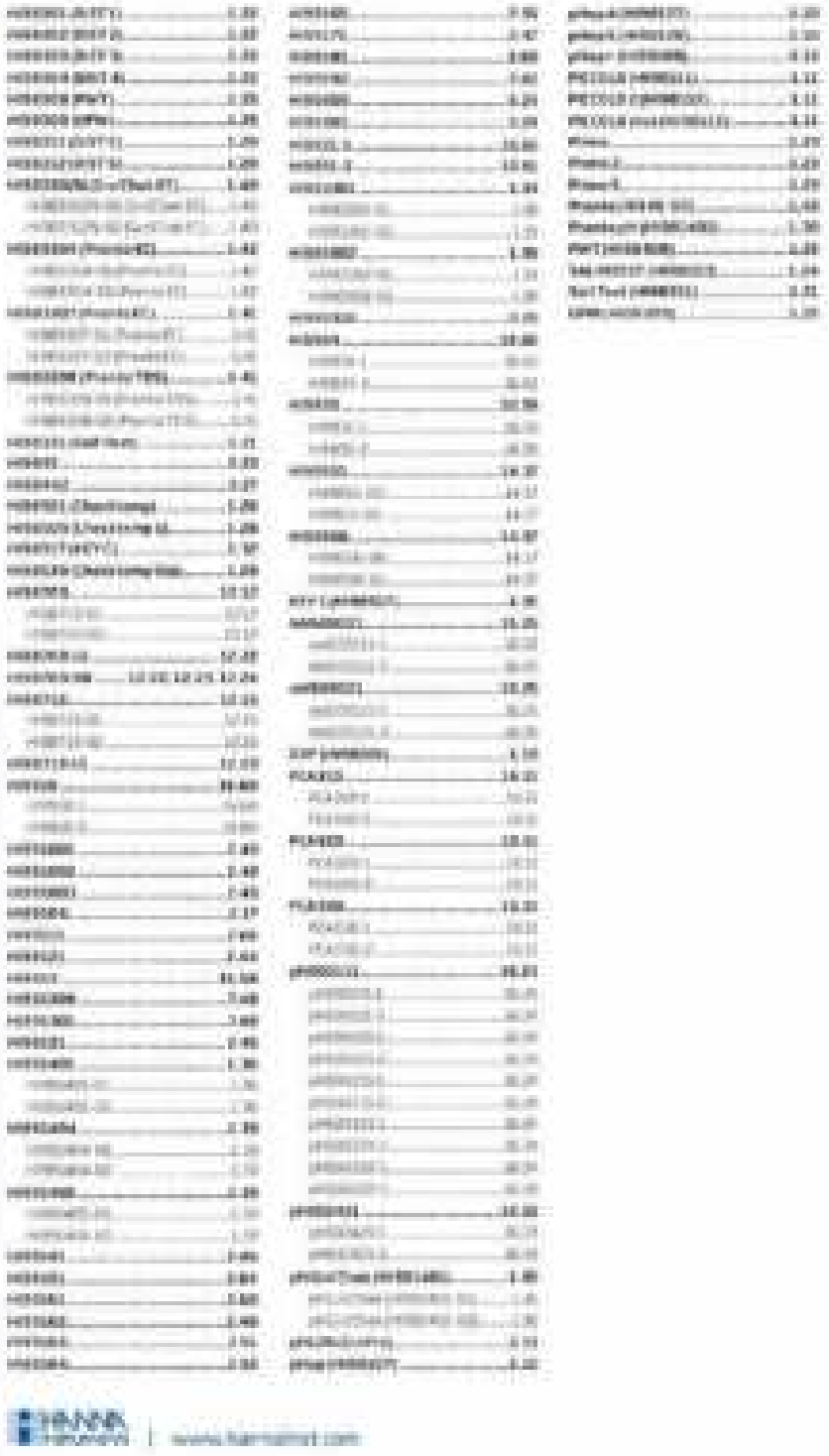












Limited Warranty, Return and Exchange

Limited Warranty

Limitations: Warranted products may be returned for repair or replacement only at the discretion of Hanna, in some circumstances, remedy may constitute refund for the price paid for the product.

Instrument Service

Product Return and Exchange

Returning Merchandise

Terms and Conditions


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