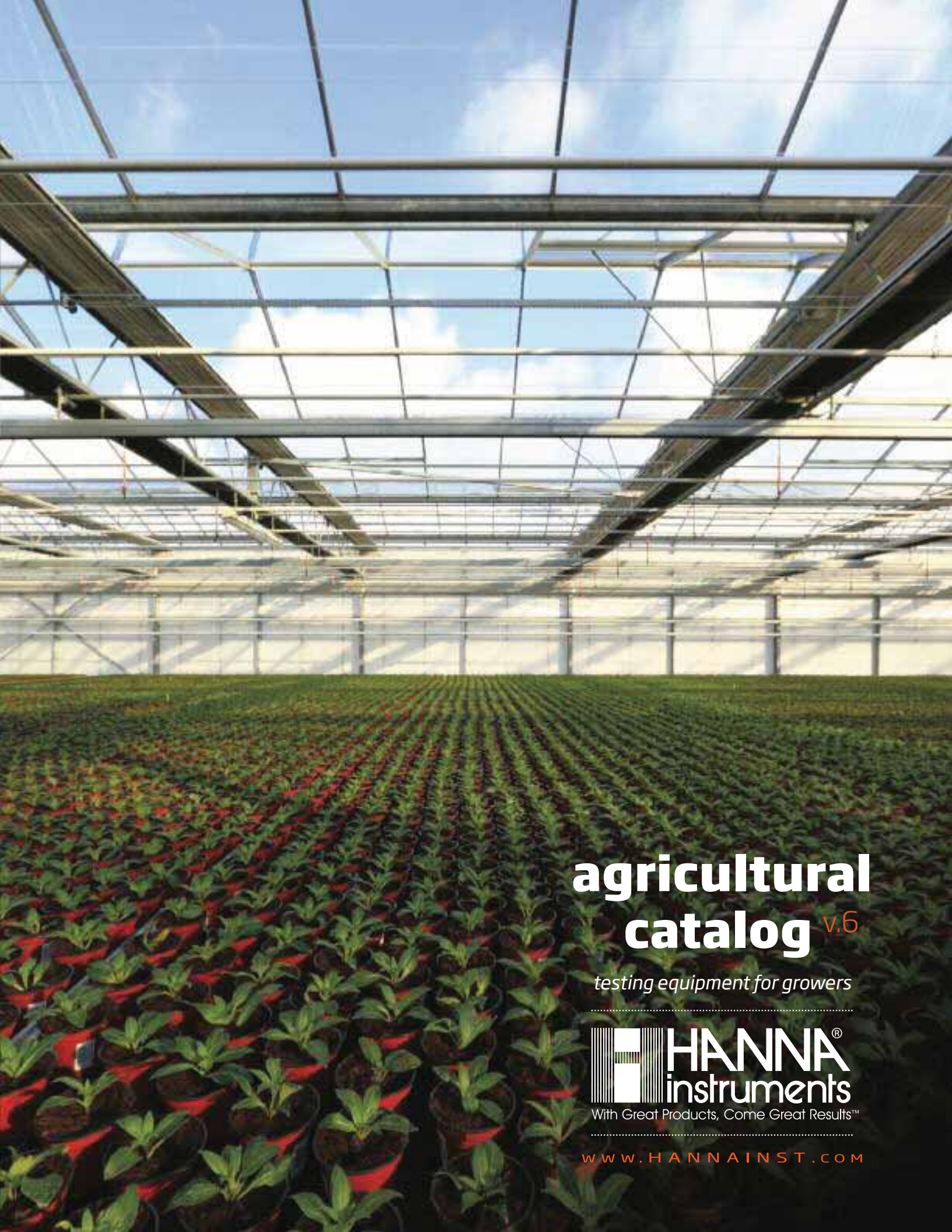

agricultural catalog v.6

testing equipment for growers

HANNA® instruments

With Great Products, Come Great Results™

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

That's 360° Value.

HANNA believes in supplying the agricultural community with a simple method for testing the parameters that are essential to the proper growth of plants and vegetables. You will find that our products are extremely easy to use, economical and will assist you in growing superior crops –assuring that the quality of your product is at its peak.

When you buy a HANNA product, you're not only buying the best value for your money, but you're also adding the benefit of HANNA's unsurpassed customer service and post-sale technical support.

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HANNA Instruments, USA

Highland Industrial Park
584 Park East Drive,
Woonsocket, Rhode Island 02895

phone: (800) 426-6287
fax: (401) 765-7575
agriculture@hannainst.com
www.hannainst.com

ISO 9001:2000 CERTIFIED

These instruments are manufactured in our European state-of-the-art ISO 9001:2000 production facility and is CE compliant to EN 61326-1 and EN 61010-1 standards.

contents

HANNA is the largest family-owned manufacturer of analytical instrumentation in the world.

For over 30 years, HANNA has never failed to deliver fresh and innovative products to its customers.

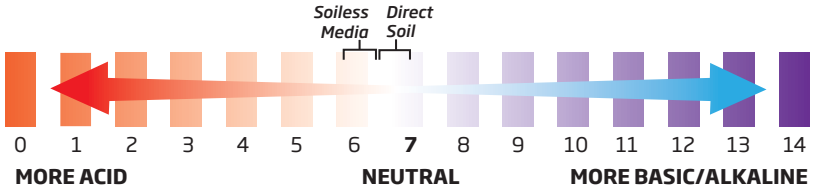
pH

Affects the solubility of minerals especially minor elements

pH Measurements

pH is the measurement of hydrogen ion concentration (H+) in water or soil. A pH of 7 is considered neutral. A pH below 7 is considered more acidic and a pH above 7 is considered more basic or alkaline. Water pH is important for plant management because it affects the solubility of fertilizers and the effectiveness of insecticides and fungicides.

Below is a pH scale that ranges from 0 – 14 pH. Most plants have an optimal pH between 5.8 and 6.4 pH in soil-less media. For direct soil applications, a typical pH range of 6.5 – 7.0 pH is more common.



Growing medium pH guidelines for some common greenhouse plants

Iron Inefficient Plants pH 5.4 to 6.2	General Group pH 5.8 to 6.4	Iron Efficient Plants pH 6.0 to 6.6
Bacopa	Chrysanthemum	Geranium (seed and zonal)
Calibrachoa	Geranium (ivy)	Marigold
Nemesia	Impatiens	New Guinea Impatiens
Pansy	Poinsettia	Lisianthus
Petunia		
Snapdragon		
Scaevoia		

Pounds of Lime to Raise the Soil pH

pH Value from Soil Test	Amount of Lime to Add/1,000 sq. ft.
Below 5.0	100 lb. agricultural lime
5.0-6.0	50 lb. agricultural lime
Above 6.0	Do not use lime

Pounds of Sulfur to Lower the Soil pH per 1,000 sq. ft.

Present pH	Desired pH				
8.0	1.8	2.4	3.3	4.2	4.8
7.5	1.2	2.1	2.7	3.6	4.2
7.0	.06	1.2	2.1	3.0	3.6
6.5		.06	1.5	2.4	2.7
lbs. to add	6.5	6.0	5.5	5.0	4.5

Increase Rate 1/2 for Clay Soil

HI 98107 pHep®
pH TESTER

- Renewable Junction
- Easy 1 or 2 point manual calibration
- 700 hour battery life

pHep®

With a renewable cloth junction, the pHep® has an extended life over typical pH testers. Since a normal junction clogs with use over time, a typical tester would normally have to be thrown away once the junction gets too clogged. HI 98107's junction is 2 cm long and when dirty can be pulled out to expose a fresh section. The pHep® effectively renews its life.

SPECIFICATIONS	HI 98107 (pHep®)
Range	0.0 to 14.0 pH
Resolution	0.1 pH
Accuracy (@20°C/68°F)	±0.1 pH
Battery Type	(4) 1.5V

ORDERING INFORMATION

HI 98107 (pHep®), is supplied with protective cap, calibration screwdriver, batteries and instructions.

HI 98103 Checker®
pH TESTER

- High accuracy with 0.01 pH resolution
- 2-point fast calibration
- Compatible with other screw type electrodes
- Ideal for testing pesticide stock solution

Checker®

The Checker® supplies users with fast and accurate readings from 0 to 14 pH with a resolution of 0.01 pH. This compact tester features a large easy-to-read LCD and simple to perform 2-point calibration.

SPECIFICATIONS	HI 98103 Checker®
Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy (@20°C/68°F)	±0.2 pH
Battery Type	(2) 1.5V

ORDERING INFORMATION

HI 98103 (Checker®) is supplied with screw-type pH electrode

ELECTRODES

HI 1270	pH electrode with screw-type connector

HI 8424
pH METER

- ORP mode
- Automatic calibration
- BEPS
- Auto shut-off
- Probe condition verification using mV mode*

SPECIFICATIONS		HI 8424
Range	**pH**	-2.00 to 16.00 pH
	mV	±699.9 mV; ±1999 mV
	Temperature	-20.0 to 120.0°C / -4.0 to 248.0°F
Resolution	**pH**	0.01
	mV	0.1 mV; 1 mV
	Temperature	0.1°C / 0.1°F
Accuracy (@20°C)	**pH**	±0.01
	mV	±0.2 mV; ±1 mV
	Temperature	±0.4°C / ±0.8°F
Battery Type		9V

ORDERING INFORMATION

HI 8424 is supplied with pH electrode, temperature probe, starter set of calibration and cleaning solutions, battery, protective case and instructions.

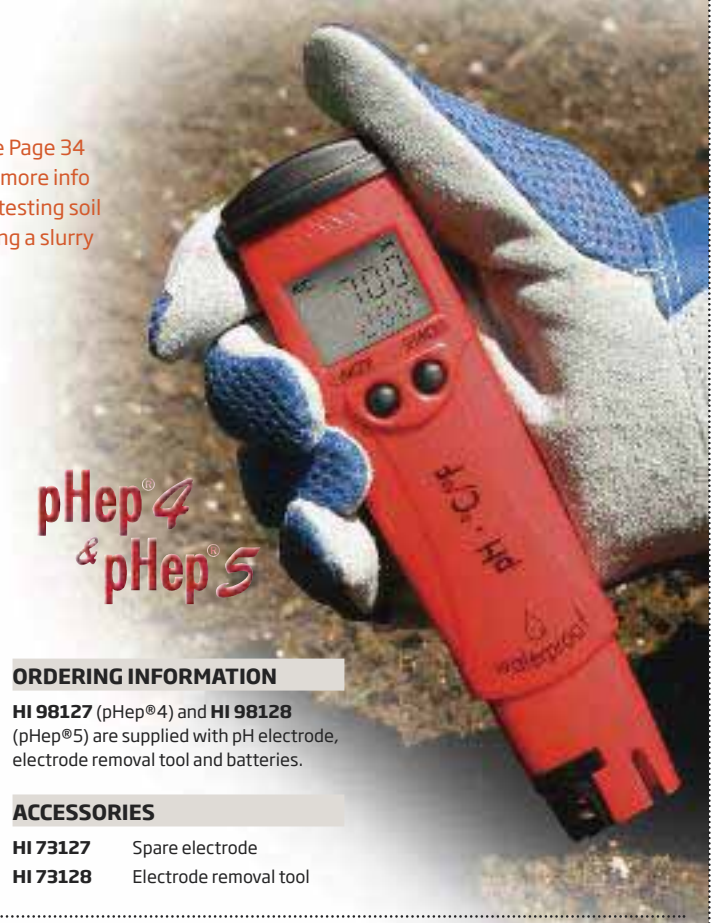
ELECTRODES

HI 1332B	ORP electrode, gel filled, PEI body, BNC connector with 1 m (3.3') cable

* pH 7 = 0.0 mV
pH 4 = 174.5 mV

HI 98127 (pHep®4) & HI 98128 (pHep®5)
pH/TEMPERATURE TESTERS

See Page 34 for more info on testing soil using a slurry



- pHep™4 reads 0.1 scale while pHep™5 reads 0.01
- Waterproof and floating
- Dual-level LCD
- Cloth, renewable junction
- **BEPS** (Battery Error Prevention System)
- Battery % display at startup
- Automatic shut-off
- Automatic Temperature Compensation
- Automatic calibration
- HOLD button to freeze readings on the display
- Replaceable pH Electrode
  The stainless steel round connector means there are no pins to bend or break.
- °F and °C measurement
- Exposed Temperature Sensor
  Provides fast response time and high accuracy in temperature compensated readings.

SPECIFICATIONS		HI 98127 (pHep®4)	HI 98128 (pHep®5)
Range	pH	-2.0 to 16.0 pH	-2.00 to 16.00 pH
	Temperature	-5.0 to 60.0°C / 23.0 to 140.0°F	
Resolution	pH	0.1 pH	0.01 pH
	Temperature	0.1°C / 0.1°F	
Accuracy (@20°C)	pH	±0.1 pH	±0.05 pH
	Temperature	±0.5°C /±1°F	
Battery Type		(4) 1.5V with BEPS	

ORDERING INFORMATION

HI 98127 (pHep®4) and **HI 98128** (pHep®5) are supplied with pH electrode, electrode removal tool and batteries.

ACCESSORIES

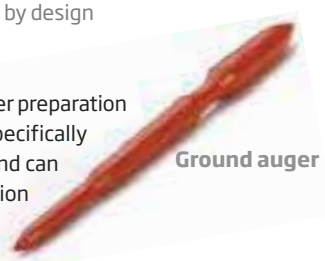
HI 73127	Spare electrode
HI 73128	Electrode removal tool

HI 99121
DIRECT SOIL pH MEASUREMENT KIT

Updated!

- Specialized soil electrode
- Waterproof
- Multi-level LCD display
  Displays current measurement along with current temperature. A quick-guide is also displayed to aid users in operation
- HOLD button
  The Hold button freezes readings on the display so you can manually record readings
- University tested for accuracy
- Automatic Temperature Compensation
- Automatic 1 or 2 point calibration
- **BEPS** (Battery Error Prevention System)
  Alerts the user in the event that low battery power could adversely affect readings
- Battery % displayed on startup
- Easy to Clean
  The glass electrode is easy to clean and keep clean by design

With HI 99121 you can test both the pH of soil directly or after preparation of a diluted sample. The HI 1292D pH electrode has been specifically designed for direct soil measurement. It has a conical tip and can be directly inserted in moist or soft soil. A soil preparation solution and ground auger is included for harder soils.


Ground auger

SPECIFICATIONS		HI 99121
Range	pH	-2.00 to 16.00 pH
	Temp.	-5.0 to 105.0°C; 23.0 to 221.0°F
Resolution	pH	0.01 pH
	Temp.	0.1°C/0.1°F
Accuracy (@20°C)	pH	±0.02 pH
	Temp.	±0.5°C (up to 60°C); ±1°C (outside); ±1°F (up to 140°F); ±2°F (outside)
Battery Type		(3) 1.5V AAA

- Protective Rubber Boot
  Our optional rubber boot helps to protect your meter

ORDERING INFORMATION

HI 99121 is supplied with pH electrode, soil auger, soil preparation solution, starter set of calibration solution sachets, 100 ml plastic beaker, batteries, hard carrying case and instructions.

ELECTRODES

HI 1292D	Specialized soil pH electrode with DIN connector and 1 m (3.3' cable)

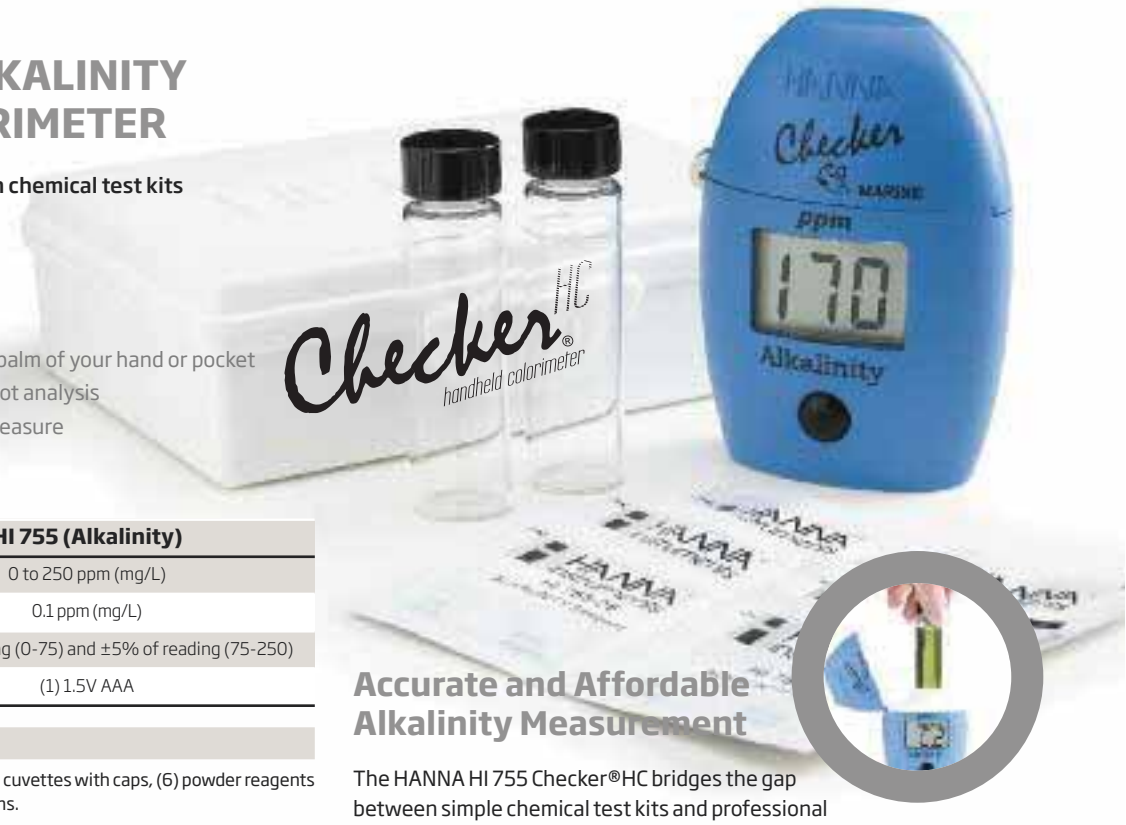
ACCESSORIES

HI 721319	Ground auger
HI 710020	Orange protective rubber boot
HI 710021	Blue protective rubber boot

HI 755
CHECKER HC™ ALKALINITY HANDHELD COLORIMETER

Easier to use and more accurate than chemical test kits
- Colorimetric method
- Large, easy to read digits
- Auto shut-off

Small Size, Big Convenience
- The Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: Zero and Measure
- Operated by a single AAA battery



SPECIFICATIONS	HI 755 (Alkalinity)
Range	0 to 250 ppm (mg/L)
Resolution	0.1 ppm (mg/L)
Accuracy	±10% of reading (0-75) and ±5% of reading (75-250)
Battery Type	(1) 1.5V AAA

ORDERING INFORMATION

HI 755 Checker®HC is supplied with (2) sample cuvettes with caps, (6) powder reagents for iodine, (1) 1.5V AAA battery and instructions.

REAGENTS AND STANDARDS

HI 755-25 Reagents for 25 tests (alkalinity)
HI 755-11 Calibration standard, 0 and 100 ppm

ACCESSORIES

HI 731318 (4) Cuvette cleaning cloth
HI 731321 (4) Glass cuvettes
HI 731225 (4) Caps for cuvettes
HI 93703-50 Cuvette cleaning solution, 230 mL

Accurate and Affordable Alkalinity Measurement

The HANNA HI 755 Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 755 Checker®HC is accurate *and* affordable.

The HI 755 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, Place the vial into the HI 755 Checker®HC, press the button and read the results. It's that easy. **See Page 34 for more information.**

alk

A measurement of dissolved Calcium Carbonate (lime)

Alkalinity

Alkalinity is another measurement growers should be aware of. Alkalinity is the ability of a substance to resist a change in pH. Alkalinity is generally defined as the buffering capacity of a solution. It affects how much acid is needed to control pH. Alkalinity is measured in mg/L of Calcium Carbonate ($CaCO_3$). The higher the alkalinity of your water, the more resistant it will be to controlling the pH. The lower the alkalinity, the higher the volatility in achieving the optimal pH value.

Common Alkalinity Problems and Suggestions		
	Problem	**Suggestion**
High Alkalinity > 150 ppm	High media pH iron deficiency	Acidify, Use acidic type fertilizer
Ideal greenhouse alkalinity: 60-120 ppm		
Low Alkalinity < 40 ppm	Low medium pH, Iron toxicity, Ca and Mg deficiency	Use basic type fertilizer, add extra lime to media, Use fertilizer with extra Ca and Mg

HI 3811
ALKALINITY TEST KIT

SPECIFICATIONS	HI 3811 (Alkalinity (as $CaCO_3$) Phenolphthalein and Total)
Range	0-100 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 3 mg/L (ppm)
Chemical Method	Phenolphthalein/ Bromphenol blue
Method	Titration

ORDERING INFORMATION

HI 3811 is supplied with enough reagents for approximately 110 tests.

HI 98331 SOIL TEST™
DIRECT SOIL EC TESTER

- Replaceable 122 mm (4.5") Penetration probe
- Automatic temperature compensation
- Lightweight and portable

The HI 98331 Soil Test™ is a pocket tester specifically designed to directly measure soil conductivity and temperature in saturated soil. With a temperature sensor in the penetration probe, readings are automatically temperature compensated. Conductivity range can be calibrated at one point and is designed to be performed in a standardized solution.

Specifications		HI 98331 Soil Test™
Range	EC	0.00 to 4.00 mS/cm (dS/m)
	Temperature	0.0 to 50.0°C
Resolution	EC	0.01 mS/cm
	Temperature	0.1°C
Accuracy (@20°C)	EC	±0.05 mS/cm (0.00 to 2.00 mS/cm), ±0.30 mS/cm (2.00 to 4.00 mS/cm)
	Temperature	±1°C
Battery Type		(4) 1.5V

ORDERING INFORMATION

HI 98331 (Soil Test™) is supplied with HI 73331 penetration conductivity probe, batteries, calibration screwdriver and instructions.

PROBES

HI 73331 Direct soil conductivity probe

ACCESSORIES

HI 731326 Calibration screwdrivers (20)

HI 98311 DiST® 5 & HI 98312 DiST® 6
EC/TDS/TEMPERATURE TESTERS

- DiST™5 µS scale and DiST™6 mS scale
- Waterproof and floating
- Replaceable graphite electrode
- Dual-level LCD
- Greater accuracy
  The graphite conductivity probe resists contamination by salt deposits in the solution.
- BEPS (Battery Error Prevention System)
- Automatic Calibration
- Automatic Temperature Compensation
- HOLD button freezes readings on the display
- Automatic shut-off

DiST 5 & DiST 6

See Page 34 for more info on testing soil using a slurry

SPECIFICATIONS		HI 98311 (DiST®5)	HI 98312 (DiST®6)
Range	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 mg/L (ppm)	0.00 to 10.00 g/L (ppt)
	Temperature	0.0 to 60.0°C / 32.0 to 140.0°F	
Resolution	EC	1 µS/cm	0.01 mS/cm
	TDS	1 mg/L (ppm)	0.01 g/L (ppt)
	Temperature	0.1°C / 0.1°F	
Accuracy (@20°C)	EC	±2% F.S.	
	TDS	±2% F.S.	
	Temperature	±0.5°C / ±1°F	
Battery Type		(4) 1.5V	

ORDERING INFORMATION

HI 98311 (DiST®5) and **HI 98312** (DiST®6) are supplied with EC/TDS probe, probe removal tool and batteries.

PROBES

HI 73311 Spare probe

ACCESSORIES

HI 73128 Probe removal tool

DiST®: HI 98300, HI 98301, HI 98302 HI 98303 & HI 98304
EC AND TDS TESTERS

- Simple 1 point calibration
- Graphite electrodes
- Automatic Temperature Compensation

SPECIFICATIONS	HI 98300 / HI 98301 (DIST® 1)	HI 98302 (DIST® 2)	HI 98303 (DIST® 3)	HI 98304 (DIST® 4)
Range	1999 mg/L (ppm)	10.00 g/L (ppt)	1999 µS/cm	19.99 mS/cm
Resolution	1 mg/L (ppm)	0.01 g/L (ppt)	1 µS/cm	0.01 mS/cm
Accuracy (@20°C/68°F)	±2% F.S.	±2% F.S.	±2% F.S.	±2% F.S.
Battery Type / Life	(4) 1.5V / approx. 200 hours of continuous use			

ORDERING INFORMATION

HI 98300 (DiST®1), **HI 98301** (DiST®1), **HI 98302** (DiST®2), **HI 98303** (DiST®3) and **HI 98304** (DiST®4) are supplied with protective cap, screwdriver, batteries and instructions.

EC

Electrical Conductivity of Total dissolved salts

HI 8730 • HI 8731 • HI 8732

EC, TDS AND TEMPERATURE METERS

- **Water-tight contruction**
- **Automatic Temperature Compensation**
- **Easy maintenance probe with a built-in temperature sensor**

HI 8730, HI 8731 and HI 8732 are complete, versatile and water-tight conductivity meters that are lightweight and easy to maintain.

These meters can be calibrated at one point for EC or TDS, while the temperature range is factory calibrated.

SPECIFICATIONS		HI 8730	HI 8731	HI 8732
Range	EC	0 to 1990 µS/cm	0 to 6000 µS/cm	0.00 to 4.00 mS/cm
	TDS	0 to 1990 mg/L (ppm)	0 to 3000 mg/L (ppm)	0 to 1999 mg/L (ppm)
	Temp.		0 to 70.0°C	
Resolution	EC	10 µS/cm	10 µS/cm	0.01 mS/cm
	TDS	10 mg/L (ppm)	10 mg/L (ppm)	1 mg/L (ppm)
	Temp.	1°C	0.1°C	0.1°C
Accuracy (@20°C)	EC/TDS		±2% F.S.	
	Temp.	±1°C	±0.5°C	
TDS Factor		0.5	0.5	Variable, 0.56 to 0.72
Battery Type			(1) 1.9V	

ORDERING INFORMATION

HI 8730, **HI 8731** and **HI 8732** are supplied with conductivity probe with built-in temperature sensor, calibration solution sachets, battery and instructions.

PROBES

HI 761285 Conductivity probe with built-in temperature sensor, DIN connector and 1 m (3.3') cable

Conductivity/TDS

"EC" stands for Electrical Conductivity. Electrical conductivity is defined as the ability of a substance to conduct an electrical current. Conductivity in a solution is directly proportional to the concentration of salts. Conductivity is temperature dependent and will rise in proportion to a temperature increase. As a result, it is important to consider an instrument that will automatically account for the temperature coefficient. Growers should conduct conductivity measurements to ensure the optimal level of nutrients are being delivered to their plants.

2 Scales for Measuring EC and TDS

EC (Electrical Conductivity) is recorded in mS (milliSiemens) or µS (MicroSiemens). 1 mS = 1000 µS

TDS (Total Dissolved Solids) is a proportion of EC and is usually recorded in ppm (parts per million). Three common proportion multiplying factors, 0.7 (hydroponics), 0.64 (soil science) and 0.5 are used to convert EC to TDS. Ex.: If the measured EC is 1000 µS, this can be converted by multiplying it by 0.7 (hydroponics) which equals 700 ppm.

EC Chart (solution EC vs. ppm N)
Checking EC for Common Blended Fertilizer and Fertilizer Salts*

Formula[1]	50	100	150	200	300	400
21-7-7	0.28	0.56	0.84	1.12	1.68	2.23
9-45-15	0.60	1.20	1.80	2.41	3.60	4.82
20-20-20	0.20	0.40	0.60	0.80	1.20	1.60
20-10-20	0.33	0.66	0.99	1.32	1.98	2.63
21-5-20	0.29	0.58	0.93	1.16	1.86	2.33
17-5-17	0.32	0.64	0.96	1.28	1.92	2.56
13-2-13	0.34	0.68	1.02	1.36	2.04	2.72
14-0-14	0.34	0.68	1.02	1.36	2.04	2.72
15-0-15	0.37	0.74	1.11	1.48	2.22	2.96
Ammonium nitrate	0.24	0.48	0.72	0.96	1.44	1.92
Ammonium phosphate	0.36	0.71	1.08	1.42	2.14	2.84
Calcium nitrate	0.31	0.63	0.94	1.26	1.88	2.51
Magnesium nitrate	0.55	1.09	1.64	2.18	3.28	4.36
Potassium nitrate	0.27	0.56	0.83	1.11	1.66	2.23

[1]$N\text{-}P_2O_5\text{-}K_2O$ formula *Values may change from manufacturer. Please refer to actual manufactuters chart for your particular fertilizer.

Calculate ppm N from a 20-10-20 fertilizer solution with a total EC of 1.8 mS and using irrigation water with an EC of 0.5 mS

EC of Fertilizer Solution	-	EC of Water	=	EC of Only the Fertilizer
1.8 mS	-	0.5 mS	=	1.3 mS

From the chart above, 20-10-20 with an EC of 1.3 Ms would give a concentration of about 200 ppm N.

To predict the EC of 20-10-20 at 200 ppm N using an irrigation water with an EC of 0.5 mS.

EC of 20-10-20 at 200 ppm N	+	EC of Water	=	EC of Ferftilizer Solution
1.3 mS	+	0.5 mS	=	1.8 mS

Sometimes, the EC of the fertilizer solution coming out of the hose is not what you expect. The problem can be caused by an incorrect dilution rate from the injector, either broken or not properly adjusted, or the fertilizer stock concentration is wrong.

To check the fertilizer concentration, take a small amount from the stock solution, dilute this in water to the target ratio, and check the EC. For example, if you think your injector is set at 1:100, then put 10 milliliters into one liter of water (this will also give a 1:100 dilution). If the EC of the solution is where it should be, then it is an injector problem. If the EC of the hand-diluted solution is off-target, then the stock concentration is not correct.

HI 993310
DIRECT SOIL ACTIVITY AND SOLUTION CONDUCTIVITY KIT

- **Supplied with 2 probes for measurement versatlity**
- **Automatic Temperature Compensation**
- **Equipped with BEPS** (Battery Error Prevention System)

HI 993310 is an instrument that has been specifically designed to address the need for conductivity measurements in soil and liquids. It is supplied with two probes: HI 76305 with a stainless steel conical tip for direct soil measurement and HI 76304 for fertilizer enriched solutions.

HI 993310 measures both the soil conductivity in EC (mS/cm) as well as salt activity (g/L). The different scales can be selected through two keys on the front panel and two separate LEDs indicate which parameter is being tested. In addition, HI 993310 is equipped with an alarm LED that automatically turns on if the soil is too dry or nutritive substances such as potassium or nitrogen are lacking. Demineralized water can be added to the soil prior to proceeding with further tests.

Direct soil measurement is performed by HI 76305 stainless steel probe.

SPECIFICATIONS		HI 993310
Range	EC	0.00 to 19.99 mS/cm
	Salt activity	0.00 to 1.00
Resolution	EC	0.01 mS/cm g/L
	Salt activity	0.01 g/L
Accuracy (@20°C/68°F)		±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Battery Type		(1) 9V

ORDERING INFORMATION

HI 993310 is supplied with plastic body conductivity probe, probe with stainless steel conic tip for direct soil measurements, soil preparation solution, battery, instructions and rugged carrying case.

PROBES

HI 76305	Stainless steel probe for direct soil measurement
HI 76304	EC probe for solution and soil sample measurement

ACCESSORIES

HI 721319	Ground auger
HI 710010	Shockproof rubber boot, orange

Why This Meter is So Important...

Conductivity is an important factor in greenhouses and hydroponics and is measured in soil as well as in fertilizer solutions.

Conductivity of soil is an excellent indication for the presence of nutritive salts. Soil conductivity is checked before and after fertilization to establish its effectiveness as well as ensuring that the soil is not too saline or damaging to the plant roots.

Conductivity of the irrigation water and fertilizer mixes are checked to make sure values are within an acceptable range and a correct fertilizer concentration strength is being applied.

HI 99300 • HI 99301
EC/TDS/TEMPERATURE METERS

Updated!

- **Amperometric technology**
- **Waterproof**
- **Multi-level LCD display**
- **HOLD button**
  Freezes readings on the display
- **Automatic Temperature Compensation**
- **Automatic single calibration with calibration indicator**
- **BEPS** (Battery Error Prevention
- **Battery % displayed on startup**.
- **Easy to clean and keep clean**

HI 99300 and HI 99301 are portable, microprocessor-based EC/TDS and temperature meters. The EC/TDS probe resists clogging and is easy to clean by design.

SPECIFICATIONS		HI 99300	HI 99301
Range	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Temp.	0.0 to 60.0°C/32.0 to 140.0°F	
Resolution	EC	1 µS/cm	0.01 mS/cm
	TDS	1 ppm (mg/L)	0.01 ppt (g/L)
	Temp.	0.1°C/0.1°F	
Accuracy (@20°C)	EC/TDS	±2% F.S.	
	Temp.	±0.5°C/±1°F	
Battery Type		(3) 1.5V AAA	

ORDERING INFORMATION

HI 99300 and **HI 99301** are supplied with EC/TDS probe, starter set of calibration solution sachets, batteries and instructions.

ELECTRODES

HI 76306	EC/TDS probe with built-in temperature sensor, DIN connector and 1 m (3.3') cable

ACCESSORIES

HI 710020	Orange protective rubber boot
HI 710021	Blue protective rubber boot

See Page 34 for calibration instructions and more info on testing soil using a slurry

HI 98129 • HI 98130
pH/CONDUCTIVITY/TDS TESTERS

- Dual-level LCD
- Cloth, renewable junction
- Automatic 2 point pH calibration
- Automatic 1 point calibration for EC and TDS
- **BEPS** (Battery Error Prevention System)
- Battery % displayed at startup
- Automatic Temperature Compensation
- Waterproof and floating
- **HOLD button to freeze readings on the display**
- **Automatic shut-off**
- **EC/TDS graphite electrode**
- **Replaceable pH Electrode**
  The stainless steel round connector means there are no pins to bend or break.
- **Exposed Temperature Sensor**
  Provides fast response time and high accuracy in temperature compensated readings.

ORDERING INFORMATION

HI 98129 (Combo) and **HI 98130** (Combo) are supplied with batteries, pH electrode and electrode removal tool.

ELECTRODES

HI 73127 Spare pH electrode

ACCESSORIES

HI 73128 Electrode removal tool

SPECIFICATIONS		HI 98129	HI 98130
Range	pH	0.00 to 14.00 pH	
	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 mg/L (ppm)	0.00 to 10.00 g/L (ppt)
	Temperature	0.0 to 60.0°C / 32.0 to 140.0°F	
Resolution	pH	0.01 pH	
	EC	1 µS/cm	0.01 mS/cm
	TDS	1 mg/L (ppm)	0.01 g/L (ppt)
	Temperature	0.1°C / 0.1°F	
Accuracy (@20°C)	pH	±0.05 pH	
	EC / TDS	±2% F.S.	
	Temperature	±0.5°C / ±1°F	
Battery Type		(4) 1.5V	

HI 991300 • HI 991301
pH/EC/TDS/ TEMPERATURE METERS

- Waterproof to IP 67
- Multi-level LCD display
- HOLD feature
- Automatic Temperature Compensation
- Automatic 1 or 2 point calibration
- **BEPS** (Battery Error Prevention System)
- Battery % displayed on startup.
- Heavy-duty
- Easy to clean and keep clean

- **Protective Rubber Boot**
  The optional rubber boot helps protect your meter

SPECIFICATIONS		HI 991300	HI 991301
Range	pH	0 to 14.00 pH	
	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Temp.	0.0 to 60.0°C/32.0 to 140.0°F	
Resolution	pH	0.01 pH	
	EC	1 µS/cm	0.01 mS/cm
	TDS	1 ppm (mg/L)	0.01 ppt (g/L)
	Temp.	0.01°C/0.1°F	
Accuracy (@20°C)	pH	±0.01 pH	
	EC/TDS	±2% F.S.	
	Temp.	±0.5°C/±1°F	
Battery Type		(3) 1.5V AAA	

ORDERING INFORMATION

HI 991300 and **HI 991301** are supplied with HI 1288 pH/EC/TDS/ temperature probe, starter set of calibration solution sachets, batteries, instructions and hard carrying case.

ELECTRODES

HI 1288 Pre-amplified pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1 m (3.3') cable

ACCESSORIES

HI 710020 Orange protective rubber boot
HI 710021 Blue protective rubber boot

HI 9813-5 • HI 9813-6 • HI 9811-5

pH/EC/TDS/°C PORTABLE METERS

Updated!

- **Water resistant**
- **Exclusive CAL CHECK™ feature**
  Alerts users of calibration status (HI 9813-6 only)
- **On-screen user guides**
  Save time with on-screen calibration guides
- **BEPS** (Battery Error Prevention System)
- **Switch parameters at the touch of a button**
- **Automatic Temperature Compensation**
  For pH and conductivity
- **Simple calibration**
  Dials located on the front panel makes calibration quick and simple, even for non-technical users
- **Battery % displayed on startup**
- **Specialized Rugged Probe**
  The 1285 series probes are designed to withstand harsh environments such as fertilizer solutions.
- **Protective Rubber Boot**
  The optional rubber boot helps protect your meter

HI 9813-6, HI 9813-5 and HI 9811-5 are versatile, water resistant multiparameter portable meters specifically designed for agricultural applications such as hydroponics, greenhouses, farming and nurseries.

- **Specialized Rugged Probe**
  The 1285 series probes are designed to withstand harsh environments such as fertilizer solutions.

HI 1285 Series Probes

The specially engineered HI 1285-5 and HI 1285-6 pH/EC/TDS/temperature probes utilize a fiber junction and gel electrolyte to provide fast response times and reduced contamination. This combination makes these probes particularly suitable to be used in fertilizer solutions.

These probes are interchangeable with other pH meters that use the same connector.

ORDERING INFORMATION

HI 9811-5, **HI 9813-5** and **HI 9813-6** are supplied with HI 1285-5 (for HI 9811-5, HI 9813-5) or HI 1285-6 CAL CHECK™ (for HI 9813-6) combination probe with DIN connector & 1 m (3.3') cable, starter set of calibration and cleaning solution sachets, check solution sachet (HI 9813-6 only), battery and instructions.

PROBES

HI 1285-5 Combination, amplified pH/EC/TDS/temperature probe with built-in temperature sensor, 8-pin DIN connector and 1 m (3.3') cable.

HI 1285-6 Combination, amplified pH/EC/TDS/temperature probe with CAL CHECK™ feature, built-in temperature sensor, 8-pin DIN connector and 1 m (3.3') cable.

SPECIFIC SOLUTIONS

HI 50021P Check solution, (25) 20 mL sachets

OTHER ACCESSORIES

HI 710007 Shockproof rubber boot, blue
HI 710008 Shockproof rubber boot, orange

HI 9813-6 EXCLUSIVE CAL CHECK™ FEATURE

HI 9813-6's CAL CHECK™ feature allows the user to check the meter calibration status at any time using by checking the HI 1285-6 probe against HI 50021 check solution.

If "Clean Probe and Calibrate" is displayed, just immerse the probe in HI 700661 cleaning solution for 5 minutes. Re-calibration is needed if "Clean Probe and Calibrate" message is displayed again after cleaning.

SPECIFICATIONS		HI 9811-5	HI 9813-5	HI 9813-6 (Cal Check™)
Range	pH	0.0 to 14.0 pH	0.0 to 14.0 pH	
	EC	0 to 6000 µS/cm	0.00 to 4.00 mS/cm	
	TDS	0 to 3000 ppm (mg/L)	0 to 1999 ppm (mg/L)	
	Temperature	0.0 to 70.0°C	0.0 to 60.0°C	
Resolution	pH	0.1 pH	0.1 pH	
	EC	10 µS/cm	0.01 mS/cm	
	TDS	10 ppm (mg/L)	1 ppm (mg/L)	
	Temperature	0.1°C	0.1°C	
Accuracy (@20°C/68°F)	pH	±0.1 pH	±0.1 pH	
	EC	±2% F.S.	±2% F.S.	
	TDS	±2% F.S.	±2% F.S.	
	Temperature	±0.5°C	±0.5°C	
Battery Type		(1) 9V	(1) 9V	

ADP
Application Designed Photometers

Updated!

HI 83200
MULTIPARAMETER PHOTOMETER

- **PC compatible via USB**
- **User friendly prompts and auto-diagnostic messages on LCD**
- **Powered by 9V batteries or 12 VDC**
- **Fast, affordable results**

You no longer need to send off your samples and wait for the results to come back since the HI 83200 is one of the most versatile, photometers on the market providing lab grade results, quickly and easily.

This practical instrument measures nutrients commonly present in fertilizer-enriched solutions such as ammonia, phosphorus, nitrate and potassium in three distinct ranges of low, medium and high concentrations. This way accuracy is maximized for each nutrient and for every concentration.

Using the HI 83200, you can test the presence and strength of nutrients right on the spot. This can translate itself into a substantial savings and improved yield.

TEST	RANGE	METHOD	REAGENT CODE
Aluminum	0.00 to 1.00 mg/L (ppm)	Aluminon	HI 93712-01
Alkalinity	0 to 500 mg/L (ppm)	Colorimetric	HI 93755-01
Ammonia MR	0.00 to 10.00 mg/L (ppm)	Nessler	HI 93715-01
Ammonia LR	0.00 to 3.00 mg/L (ppm)	Nessler	HI 93700-01
Bromine	0.00 to 8.00 mg/L (ppm)	DPD	HI 93716-01
Calcium	0 to 400 mg/L (ppm)	Oxalate	HI 937521-01**
Chlorine Dioxide	0.00 to 2.00 mg/L (ppm)	Chlorophenol Red	HI 93738-01
Chlorine*, Free	0.00 to 2.50 mg/L (ppm)	DPD	HI 93701-01
Chlorine*, Total	0.00 to 3.50 mg/L (ppm)	DPD	HI 93711-01
Chromium VI HR	0 to 1000 µg/L	Diphenylcarbohydrazide	HI 93723-01
Chromium VI LR	0 to 300 µg/L	Diphenylcarbohydrazide	HI 93749-01
Color	0 to 500 PCU	Colorimetric Platinum Cobalt	–
Copper HR	0.00 to 5.00 mg/L (ppm)	Bicinchoninate	HI 93702-01
Copper LR	0 to 1000 µg/L	Bicinchoninate	HI 95747-01
Cyanuric Acid	0 to 80 mg/L (ppm)	Turbidimetric	HI 93722-01
Fluoride	0.00 to 2.00 mg/L (ppm)	SPADNS	HI 93729-01
Hardness (calcium)	0.00 to 2.70 mg/L (ppm)	Colorimetric	HI 93720-01
Hardness (magnesium)	0.00 to 2.00 mg/L (ppm)	Colorimetric	HI 93719-01
Hydrazine	0 to 400 µg/L	p-Dimethylaminobenzaldehyde	HI 93704-01
Iodine	0.0 to 12.5 mg/L (ppm)	DPD	HI 93718-01
Iron HR	0.00 to 5.00 mg/L (ppm)	Phenantroline	HI 93721-01
Iron LR	0 to 400 µg/L	TPTZ	HI 93746-01**
Magnesium	0 to 150 mg/L (ppm)	Calmagite	HI 937520-01**
Manganese HR	0.0 to 20.0 mg/L (ppm)	Periodate Oxidation	HI 93709-01
Manganese LR	0 to 300 µg/L	PAN	HI 93748-01**
Molybdenum	0.0 to 40.0 mg/L (ppm)	Mercaptoacetic Acid	HI 93730-01
Nickel HR	0.00 to 7.00 g/L	Photometric	HI 93726-01
Nickel LR	0.000 mg/L to 1.000 mg/L (ppm)	PAN	HI 93740-01**
Nitrate	0.0 to 30.0 mg/L (ppm)	Cadmium Reduction	HI 93728-01
Nitrite HR	0 to 150 mg/L (ppm)	Ferrous Sulfate	HI 93708-01
Nitrite LR	0.00 to 0.35 mg/L (ppm)	Diazotization	HI 93707-01
Oxygen, Dissolved (DO)	0.0 to 10.0 mg/L (ppm)	Winkler	HI 93732-01
Ozone	0.00 to 2.00 mg/L (ppm)	DPD	HI 93757-01
pH	6.5 to 8.5 pH	Phenol Red	HI 93710-01
Phosphate HR	0.0 to 30.0 mg/L (ppm)	Amino Acid	HI 93717-01
Phosphate LR	0.00 to 2.50 mg/L (ppm)	Ascorbic Acid	HI 93713-01
Phosphorus	0.0 to 15.0 mg/L (ppm)	Amino Acid	HI 93706-01
Potassium HR	20 to 200 mg/L (ppm)	Turbidimetric Tetraphenylborate	HI 93750-01
Potassium MR	10 to 100 mg/L (ppm)	Turbidimetric Tetraphenylborate	HI 93750-01
Potassium LR	0.0 to 20.0 mg/L (ppm)	Turbidimetric Tetraphenylborate	HI 93750-01
Silica	0.00 to 2.00 mg/L (ppm)	Heteropoly blue	HI 93705-01
Silver	0.000 to 1.000 mg/L (ppm)	PAN	HI 93737-01**
Sulfate	0 to 150 mg/L (ppm)	Turbidimetric	HI 93751-01
Zinc	0.00 to 3.00 mg/L (ppm)	Zincon	HI 93731-01

ORDERING INFORMATION

HI 83200 is supplied with cuvettes (4), bottle for DO test, batteries, 12 Vdc adapter and instructions.

SOLUTIONS

HI 93703-50 Cuvette cleaning solution, 230 mL

ACCESSORIES

HI 83900-30 Lysimeter with 30 cm (0.98') tube
HI 83900-60 Lysimeter with 60 cm (1.97') tube
HI 83900-90 Lysimeter with 90 cm (2.95') tube
HI 731318 Cuvette cleaning cloth (4)
HI 731321 Glass cuvettes (4 pcs)
HI 731325N Cuvette caps (4)
HI 740034 Cap for 100 mL beaker (6)
HI 740036 100 mL plastic beaker (6)
HI 740038 60 mL glass bottle and stopper
HI 740142 1 mL graduated syringe
HI 740143 1 mL graduated syringe (6)
HI 740144 Pipette tip (6)
HI 740157 Plastic pipette (20)
HI 740220 25 mL glass cylinder with cap (2)
HI 740223 170 mL plastic beaker
HI 740224 170 mL plastic beaker (12)
HI 740225 60 mL graduated syringe
HI 740226 5 mL graduated syringe
HI 740227 Filter assembly
HI 740228 Filter disc (25)
HI 740229 100 mL Polypropylene cylinder
HI 740230 Demineralized water, 230 ML
HI 92000 Windows® Compatible Software
HI 920010 PC connection cable
HI 93703-54 Dried resin (100 g)
HI 93703-55 Activated Carbon (50)

* For Chlorine, liquid reagents are available..
** Reagents for 50 tests

Plant Nutrition

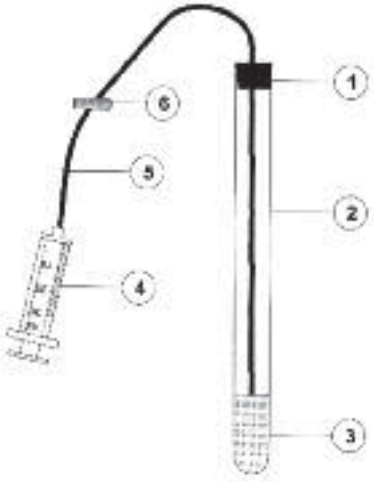
The three elements that are most needed by plants are nitrogen (N), phosphorous (P) and potassium (K). This is the reason why they are called macronutrients and should be given to plants.

Nitrogen is indispensable for the plant's life and is a key factor in fertilization. Nitrogen allows the development of the vegetative activity of the plant, in particular, causes lengthening of trunks and sprouts and increases the production of foliage and fruits. An excess of nitrogen weakens the plants' structure creating an unbalanced relationship between the leaves and the stalks. In addition, the plant becomes less resistant to diseases.

Phosphorous is an important element in the composition of DNA and RNA, the regulators of the energetic exchange (ATP & ADP), as well as the reserve substances in seeds and bulbs. It contributes to the formation of buds, roots, blooming, and lignification.

A lack of phosphorous results in: stifling of plant, slow growth, a reduction of production, smaller fruits and a lower expansion of the roots.

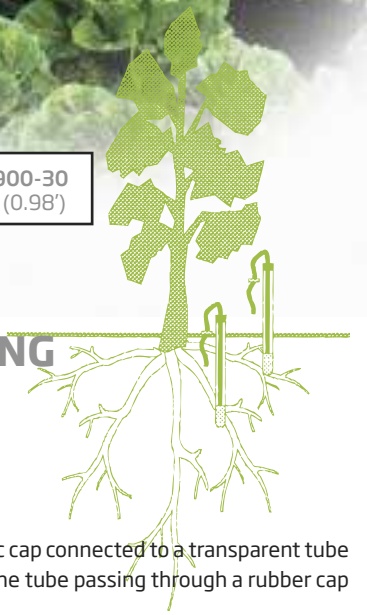
Even if **Potassium** is not a constituent of important compounds, it plays a remarkable role in many physiological activities like the control of cellular turgor and the accumulation of carbohydrates. It increases the size of fruits, their flavor, as well as yielding a positive effect on the color and fragrance of flowers. Potassium also makes plants more resistant to disease.



1. Rubber cap
2. Soil solution sampler tube
3. Porous ceramic tip
4. 30 mL syringe (pump)
5. Rubber suction capillary
6. Finger clamp

Available in 3 Lengths

HI 83900-90	HI 83900-60	HI 83900-30
90 cm (2.95')	60 cm (1.97')	30 cm (0.98')



HI 83900
SUCTION LYSIMETER FOR ROOT LEVEL SOIL MONITORING

- **Perfect companion to the HI 83200**
- **Monitor soil composition right at the roots**
- **Easy to use**

The HI 83900 suction lysimeter is built with a porous ceramic cap connected to a transparent tube for soil solution extraction. A rubber capillary is inserted in the tube passing through a rubber cap and reaching the ceramic tip.

The HI 83900 series lysimeter is an ideal tool for collecting soil solution samples and then perform quantitative chemical analysis. In this way the operator can easily monitor the level of nutrients, such as ammonia, nitrate, phosphorous and potassium, sulfate, calcium, magnesium.

The ceramic tip of the lysimeter can be used in all types of soil, and it is made of sinterized material that does not react with nutrient elements. The soil solution, therefore, is not affected by the chemical composition of the ceramic cap and the test results are always precise and reliable.

The HI 83900 allows the extraction of a solution from the soil by creating a vacuum (negative pressure or suction) inside the sampler tube, that exceeds the soil water tension. This will establish an hydraulic gradient for the solution to flow through the porous ceramic cap and into the lysimeter tube. Typically, a vacuum of about -60 cb (centibar) should be drawn.

For better monitoring of soil solution composition throughout an entire growth period of crops, at least two lysimeters should be installed in the root zone of a representative plant–one at the upper part and the other in the lower part of the root zone.

For better accuracy and repeatability of results, it is recommended to replicate the above described installation in at least two more locations.

ORDERING INFORMATION

HI 83900-30 is comprised of 30 cm (0.98') tube sampler tube ending with porous ceramic tip, capillary rubber tube with rubber cap and finger clamp, cleaning solution stater kit, 30 mL syringe and instructions.

HI 83900-60 is comprised of 60 cm (1.97') tube sampler tube ending with porous ceramic tip, capillary rubber tube with rubber cap and finger clamp, cleaning solution stater kit, 30 mL syringe and instructions.

HI 83900-90 is comprised of 90 cm (2.95') tube sampler tube ending with porous ceramic tip, capillary rubber tube with rubber cap and finger clamp, cleaning solution stater kit, 30 mL syringe and instructions.

ACCESSORIES

HI 83900-25 Cleaning solution kit, 500 mL

HI 96801 • HI 96811

DIGITAL BRIX REFRACTOMETERS FOR SUGAR ANALYSIS

- **Quick, Precise Results**
  Readings are displayed in approximately 1.5 seconds.
- **Dual Level LCD**
  Displays primary measurement and temperature simultaneously.
- **Easy Measurement**
  Place a few drops of the sample in the well and press the READ key.
- **Small Sample Size**
  Sample size can be as small as 2 metric drops.
- **IP 65 Waterproof Protection**
  Built to perform under harsh laboratory and field conditions.
- **Stainless Steel Sample Well**
  Easy to clean and corrosion resistant.
- **Single Point Calibration**
  Calibrate with distilled or deionized water.
- **B.E.P.S. (Battery Error Prevention System)**
  Alerts you in the event that low battery power could affect readings.
- **Automatic Shut-off**
- **Automatic Temperature Compensation**

Brix is measured with a refractometer and is the determination of how much sugar is in the plant sap. Brix is really important as it is a direct measurement of how well the plant is performing. The sugar molecule produced in the phytosynthesis process is the building block we see growing above and below the ground in the form of leaves, stems, fruit, branches and roots.

SPECIFICATIONS		HI 96801	HI 96811
Range	Sugar Content	0 to 85 %Brix	0 to 50 %Brix
	Temperature	0 to 80°C (32 to 176°F)	
Resolution	Sugar Content	±0.1 %Brix	
	Temperature	±0.1°C (0.1°F)	
Accuracy (@20°C)	Sugar Content	±0.2 %Brix	
	Temperature	±0.3°C (0.5°F)	
Battery Type		(1) 9V	

ORDERING INFORMATION

HI 96801 and **HI 96811** are supplied with battery and instructions.

Refractive Index of Crop Juices - Calibrated in % Sucrose or BRIX

	Poor	Average	Good	Excellent
Fruits				
Apples	6	10	14	18+
Avocados	4	6	8	10+
Bananas	8	10	12	14+
Cantaloupe	8	12	14	16+
Casaba	8	10	12	14+
Cherries	6	8	14	16+
Coconut	8	10	12	14+
Grapes	8	12	16	20+
Grapefruit	6	10	14	18+
Honeydew	8	10	12	14+
Kumquat	4	6	8	10+
Lemons	4	6	8	12+
Limes	4	6	10	12+
Mangos	4	6	10	14+
Oranges	6	10	16	20+
Papayas	6	10	18	22+
Peaches	6	10	14	18+
Pears	6	10	12	14+
Pineapple	12	14	20	22+
Raisins	60	70	75	80+
Raspberries	6	8	12	14+
Strawberries	6	10	14	16+
Tomatoes	4	6	8	12+
Watermelon	8	12	14	16+
Grasses				
Alfalfa	4	8	16	22+
Grains	6	10	14	18+
Sorghum	6	10	22	30+

	Poor	Average	Good	Excellent
Vegetable				
Asparagus	2	4	6	8+
Beets	6	8	10	12+
Bell Peppers	4	6	8	12+
Broccoli	6	8	10	12+
Cabbage	6	8	10	12+
Carrots	4	6	12	18+
Cauliflower	4	6	8	10+
Celery	4	6	10	12+
Corn Stalks	4	8	14	20+
Corn (Young)	6	10	18	24+
Cow Peas	4	6	10	12+
Endive	4	6	8	10+
English Peas	8	10	12	14+
Escarole	4	6	8	10+
Field Peas	4	6	10	12+
Green Beans	4	6	8	10+
Hot Peppers	4	6	8	10+
Kohl Rabi	6	8	10	12+
Lettuce	4	6	8	10+
Onions	4	6	8	10+
Parsley	4	6	8	10+
Peanuts	4	6	8	10+
Potatoes, Irish	3	5	7	8+
Potatoes, Red	3	5	7	8+
Potatoes, Sweet	6	8	10	14+
Romaine	4	6	8	10+
Rutabagas	4	6	10	12+
Squash	6	8	12	14+
Sweet Corn	6	10	18	24+
Turnips	4	6	8	10+

HI 8410
DISSOLVED OXYGEN CONTROLLER

- Extended range to 50 mg/L (ppm)
- Manual single point calibration
- Selectable 0-20 or 4-20 mA output
- Low maintenance Galvanic probe
- Backlit LCD
- Operational mode LED indicators
- Transparent splash-proof cover
- Recorder output
- Setpoint and alarm relay
- Dosing and over dosing control
- Setpoint, alarm and hysteresis ranges

The HI 8410 is an extended range panel mounted Dissolved Oxygen (DO) controller that is used to maintain and monitor the concentration of DO in a wide range of agricultural applications. The HI 8410 utilizes a Galvanic probe and typically requires less maintenance than a Polarographic style making it ideal for long term monitoring. Calibration is single set point and can be done in zero oxygen solution.

SPECIFICATIONS	HI 8410
Range	0.0 to 50.0 mg/L (ppm) O_2 0 to 600 % O_2 -5.0 to 50.0 °C
Resolution	0.1 mg/L (ppm) or 1% (O_2) / 0.1 °C
Accuracy (@20°C/68°F)	±1% of reading (O_2) / ±0.2 °C
Power Supply	115 Vac ±10% or 230 Vac ±10%; 50/60 Hz

ORDERING INFORMATION

The **HI 8410** is supplied complete with mounting brackets and instructions.

Probe

HI 76409/4 Galvanic DO probe with built-in temperature sensor and 4 m cable

HI 76409/10 Galvanic DO probe with built-in temperature sensor and 10 m cable

HI 9143
DISSOLVED OXYGEN METER

- Altitude, salinity and temperature compensation
- HOLD button to freeze reading on the display

Simple on-site calibration requires no chemical solutions. Just expose the probe to air and press the CAL button. In a few minutes, the meter is calibrated and ready to use. Auto-calibration eliminates the need to use a screwdriver or other devices to adjust the reading.

SPECIFICATIONS		HI 9143
Range	O_2	0.00 to45.00 mg/L (ppm)
	% Saturation O_2	0.0 to 300.0%
	°C	0.0 to 50.0°C
Resolution	O_2	0.01 mg/L (ppm)
	% Saturation O_2	0.1%
	°C	0.1°C
Accuracy (@ 20°C/68°F)	O_2	±1.5% F.S
	% Saturation O_2	±1.5% F.S
	°C	±0.5°C
Power Supply		(4) 1.5V AA batteries; input for 12 Vdc power adapter

ORDERING INFORMATION

HI 9143 is supplied with HI 76407/4 DO probe with 4 m (13') cable, (2) spare membranes, HI 7041S electrolyte solution (30 mL), batteries, instructions and protective case.

ACCESSORIES

HI 7041S	Refilling electrolyte solution, 30 mL
HI 7040L	Zero oxygen solution, 500 mL
HI 76407A/P	Replacement membranes (5)

Dissolved Oxygen Meters

Dissolved Oxygen is a term commonly used for the measurement of the amount of free molecular oxygen (O_2) dissolved in a unit volume of water usually expressed in milligrams per liter (mg/l), parts per million (ppm), or percent saturation. Dissolved Oxygen is an indicator of water quality.

In agriculture, growers should measure the dissolved oxygen if their primary water source is a natural body of water such as a stream, pond, or well. Low Dissolved Oxygen in irrigation water encourages disease and poor growth.

Hydroponic growers should be measuring DO to ensure there is sufficient oxygen in their irrigation water that is being transferred to the roots of their plants.

HI 9142
DISSOLVED OXYGEN METER

- Automatic temperature compensation
- Affordable and efficient
- Designed for harsh conditions

SPECIFICATIONS	HI 9142
Range	0.0 to 19.9 mg/L (ppm)
Resolution	0.1 mg/L (ppm)
Accuracy (@20°C/68°F)	±1.5% F.S.
Battery Type	(4) 1.5V AA

ORDERING INFORMATION

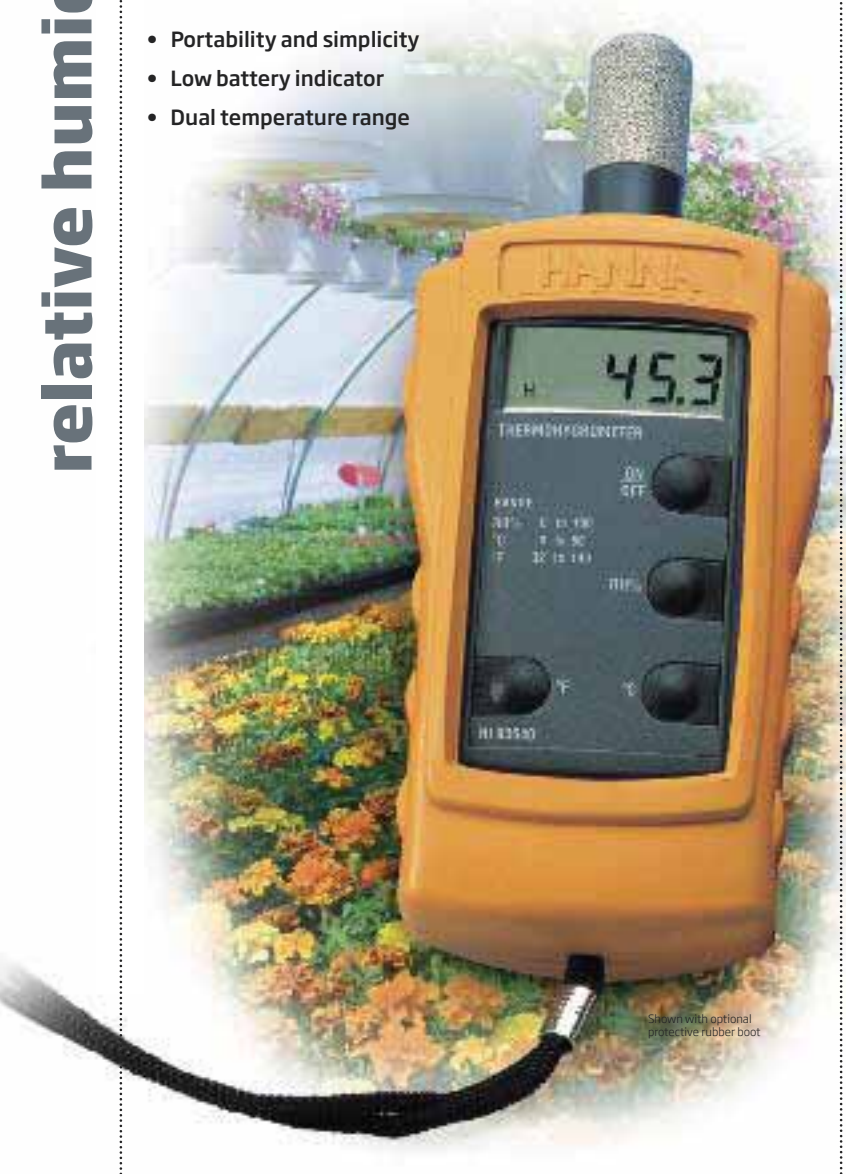
HI 9142 is supplied with HI 76407/4 DO probe with 4 m (13') cable, (2) spare membranes, HI 7041S electrolyte solution (30 mL), calibration screewdriver, batteries, instructions and protective case.

ACCESSORIES

HI 7041S	Refilling electrolyte solution, 30 mL
HI 7040L	Zero oxygen solution, 500 mL
HI 76407A/P	Replacement membranes (5)

HI 93640
THERMO-HYGROMETER WITH BUILT-IN SENSOR

- Portability and simplicity
- Low battery indicator
- Dual temperature range



Shown with optional protective rubber boot

SPECIFICATIONS		HI 93640
Range	RH	5.0 to 95.0%
	Temperature	0.0 to 60.0°C ; 32 to 140°F
Resolution	RH	0.1%
	Temperature	0.1°C; 1°F
Accuracy	RH	±2%
	Temperature	±0.4°C; ±1°F (excluding probe error)
Battery Type		(1) 9V

ORDERING INFORMATION

HI 93640 is supplied with battery

ACCESSORIES

HI 710011	Probe sintered cap
HI 7102	Calibration chamber for probes with sintered cap
HI 710007	Blue Shockproof rubber boot
HI 710008	Orange Shockproof rubber boot

HI 9565
THERMO-HYGROMETER WITH DEW POINT

- Backlit LCD
- Auto shut-off
- Calibration data-logging probe
- HOLD button

SPECIFICATIONS		HI 9565
Range	RH	20.0 to 95.0%
	Temperature	0.0 to 60.0°C / 32 to 140.0°F
	Dew Point	-20.0 to 60.0°C / -4.0 to 140.0°F
Resolution	RH	0.1% RH
	Temperature	0.1°C / 0.1°F
	Dew Point	0.1°C / 0.1°F
Accuracy	RH	±3 % RH (50 to 85 % RH & 15 to 40°C); ±5% RH (outside)
	Temperature	±0.5°C / ±1°F
	Dew Point	±2°C /±4°F (50 to 85 % RH & 15 to 40°C); ±4.5°C /±9°F (outside)
Battery Type		(1) 9V

ORDERING INFORMATION

HI 9565 are supplied with RH/temperature probe, battery, instruction manual and protective case.

ELECTRODES

HI 70602 RH probe with temperature sensor, 1 m (3.3')

HI 8666
RELATIVE HUMIDITY AND TEMPERATURE TRANSMITTER

- Removable sintered metal cap
- Dual-range, compact transmitter
- Can be quickly removed for maintenance with minimal downtime
- Fast response time

This solid-state transmitter plugs into its wall-mounted receptacle for on-site, continuous monitoring of relative humidity and temperature in critical or controlled environments.

SPECIFICATIONS		HI 8666
Range	RH	0% (4 mA) to 100% (20 mA)
	temperature	-20°C (4 mA) to 60°C (20 mA)
Accuracy	RH	±2% (5% to 95% RH)
	temperature	±1% F.S.

ORDERING INFORMATION

HI 8666 is supplied with sensor protective cap, mounting brackets and instructions

ACCESSORIES

HI 710011	Probe sintered cap

HI 97500
PORTABLE LUX METER

- Three measurement ranges
- Rugged, waterproof case
- Low-battery indicator

SPECIFICATIONS	HI 97500
Range	0.001 to 1.999 Klux; 0.01 to 19.99 Klux; 0.1 to 199.9 Klux
Resolution	0.001 Klux; 0.01 Klux; 0.1 Klux
Accuracy	±6% of reading ±2 digits
Sensor	human-eye-response silicon photodiode
Battery Type	(1) 9V alkaline

ORDERING INFORMATION

HI 97500 is supplied with battery, sensor on 1.5 m (4.9' cable), protective case and instructions.

lux

The Quality of Light

Quality of light is very important in the workplace, schools, greenhouses and public buildings. Too little light (or luminous intensity) affects the quantity and quality of performance of both people and crops. HANNA's light meter uses special optic filters to match the spectral sensitivity of the human eye.

Luminous intensity is measured and reported in foot-candles (ft-c) or in lux (lx). Light meters are commonly referred to as lux meters. One lux is equal to one lumen per square meter and one foot-candle is equal to one lumen per square foot. To convert measurements use the following formula:

foot-candle = lux x 0.0929

lux = foot-candle x 10.764

HANNA's light measuring sensor is a photo diode that converts incident light into an electronic signal that is read and displayed on the meters LCD as Klx which is 1,000 lx. So multiply the reading by 92.9 to get the measurement in foot candles.

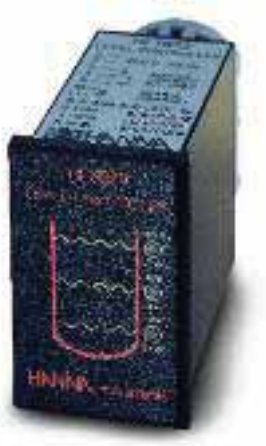
Plant Light Requirements

Light provides the energy source needed for plants to manufacture food (photosynthesis). The amount of light is commonly measured in foot-candles (ft-c) or lux. Plants differ greatly in their light intensity requirements. Indoor plants are often classified by the amount of light necessary for growth:

- Low (minimum 1.1 Klx, .8 to 2.1 preferred for good growth)
- Medium (minimum 1.1 to 1.6 Klx, 2.1 to 5.4 preferred)
- High (minimum 1.6 to 10.8 Klx, 5.4 to 10.8 preferred)
- Very high (minimum 10.8 Klx, 10.8+ preferred)

About 1.1 Klx for 12 hours per day are necessary simply to maintain plant quality for one year and at least 2.1 Klx for 12 hours per day are necessary for foliage plants to manifest any benefit from fertilization.

While lack of sufficient light results in poor plant growth, too much light can also be harmful. Shade plants cannot tolerate excessively high light levels. When a plant receives too much direct light, the leaves bleach or scald, sometimes dying. This often happens after moving a plant outdoors in direct light. Any changes in light intensity should be gradual.



HI 7871 • HI 7873
MINI LEVEL CONTROLLERS

HI 7871 and HI 7873 mini level controllers are ideal for liquid level control over distances of up to 100 m (330'). The are highly compact and will fit in tight spaces.

These easy-to-use controllers are ideal for liquid level applications such as nutrient tank control.

HI 7871 features high and low level control, while HI 7873 includes an overflow alarm. Both instruments are connected to a 2-wire transmitter (HI 7874), which is ideal for level monitoring in remote applications.

*A **complete** liquid level measuring system **requires**:*

1) A controller (HI 7871 or HI 7873)
2) A bar holder with amplifier circuitry (HI 7874)
3) A package of measuring bars (HI 731324)
4) An undecal connector (HI 7164)

HI 7871 requires 3 bars, one each for low and high levels and the third as a consent sensor. HI 7873 requires 4 bars with the additional bar used for overflow measurement.

SPECIFICATIONS	HI 7871	HI 7873
Transmission	max 100 m (330')	
Electrical Connection	HI 7164 undecal connector (not included)	
Level Adjustment	high and low	high, low and overflow
Level Indication	high and low	high, low and overflow
Sensor Bars	3 (not included)	4 (not included) (HI 731324 pack of 5)
Transmitter	HI 7874 (not included)	
Output Contact	1 relay (2A/250 Vac, 30 Vdc)	2 relays (2A/250 Vac, 30 Vdc)

ORDERING INFORMATION

HI 7871/115 and **HI 7873/115** (115 Vac) and **HI 7871/220** and **HI 7873/220** (220 Vac) are supplied with mounting brackets and instructions.

ACCESSORIES

HI 7874	Level transmitter with internal amplifier
HI 7164	Undecal connector
HI 731324	Stainless steel threaded measuring bars (5)

Soil Temperature

Soil temperature is critical for propagation. Each plant has an ideal germination and rooting temperature. In addition, knowing the soil temperature is imperative when battling pests and diseases. Since certain pests thrive in certain soil temperatures, having that information can really help you stay ahead of the game.

- **CAL CHECK®**
- **NO MERCURY or other hazardous materials**
- **Fast response time**
- **Very durable**
- **Easy to read LCD**
- **°C model available (HI 98501)**

HI 98502
CHECKTEMP® DIGITAL THERMOMETER

Checktemp® is provided with the CAL CHECK® function: simply activate a switch and the instrument will simulate an ice bath at 32.0°F. The LCD should display readings within a range of ±0.3°C (±0.5°F). CAL CHECK® guarantees accuracy every time!

The sharp-tip probe of the Checktemp® easily penetrates semi-solid mediums, making routine checks quick and effortless.

SPECIFICATIONS	HI 98502 (Checktemp®F)
Range	-58.0 to 302.0°F
Resolution	0.1°F (58.0 to 199.9°F); 1°F (200 to 302°F)
Accuracy	±0.5°F (-4 to 194°F) ±1°F (outside)
Battery Type	(1) 1.5V

ORDERING INFORMATION

HI 98502 (Checktemp®F) is supplied with penetration probe, protective cap, battery and instructions.

HI 99556-00
DUAL INFRARED/PROBE THERMOMETER

- **Non-Invasive measurement**
- **External probe can also be used**
- **1 second IR response time**
- **°C models available: HI 99556-00 (-10 to 300°C) and HI 99556-10 (-20.0 to 199.9°C)**

The HI 99556 thermometer employs infrared technology to measure surface temperatures. Infrared readings are extremely fast with a response time typically around 1 second.

In order to measure the temperature, simply point to the product or target and hold down the measurement key.

If you also need to check the core temperature, simply attach the external probe.

SPECIFICATIONS		HI 99556-01
Range	IR	14 to 572°F
	Probe	-40 to 302°F
Resolution	IR	1°F
	Probe	1°F
Accuracy	IR	±2% of reading or ±3°F
	Probe	±1°F (0 to 250°F); ±1°F +1% reading (outside)
Battery Type		(1) 9V

ORDERING INFORMATION

HI 99556-01 is supplied with internal IR sensor, external temperature probe, battery and instructions.

PROBES

HI 765PW Temperature probe for HI 99556

HI 143
T-LOGGER
with Locking Wall Cradle

- **Logging start through PC** by pressing a button or at a set time
- **Selectable sampling interval** from 1 minute to 24 hours
- **Up to 4,000 logged samples**
- **Selectable measurement unit, °C or °F**
- **IP65 water resistant protection**
- **Min/Max values are stored and displayed**
- **Programmable high and low alarms**
- **Non-volatile storage of logging parameters and data**
- **Battery level indicator on display**
- **Security password supported software**
- **Ideal for GAP certification**

The HI 143 is controlled via USB or RS232 on a PC with HANNA's Windows® compatible application software. The supplied wall cradle makes it easy to lock the meter in place to prevent tampering and the application software supports security passwords.

SPECIFICATIONS	HI 143
Range	-30. to 70.0°C/-22.0 to 158.0°F
Resolution	0.1°C/0.1°F
Accuracy	±0.4°C (-20 to 60°C); ±0.6°C (outside) ±0.7°F (-4 to 140°C); ±1.1°F (outside)
Battery Type	(1) CR2032 3V lithium ion

ORDERING INFORMATION

HI 143-00 is supplied with USB communication cradle, Windows® compatible application software, lithium battery, wall cradle, lock and instructions.

HI 143-10 is supplied with RS232 communication cradle, Windows® compatible application software, lithium battery, wall cradle, lock and instructions.

HI 143 is supplied with lithium battery, wall cradle, lock and instructions (software and comm. cradle required).

ACCESSORIES

HI 143002	USB communication cradle.
HI 143001	RS232 communication cradle.

What is Chlorine and ORP?

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

ORP stands for Oxidation Reduction Potential. Oxidation Reduction Potential is the potential at which oxidation occurs. In simple terms, ORP measurements allow for easy monitoring and tracking of critical disinfectant levels. The ideal ORP range for continuous disinfection is between 650 and 700mV.

Chlorine Use in Irrigation water

Chlorine can be an effective sanitizer in irrigation water applications. Some applications include:

- **Recycling irrigation water**
- **Sanitizing irrigation water from natural sources such as ponds, rivers, streams or wells.**
- **Maintain and clean sprinkler and nozzle heads**
- **Clean up algae growing on walls, benches and soil surfaces**
- **Sanitizing produce**

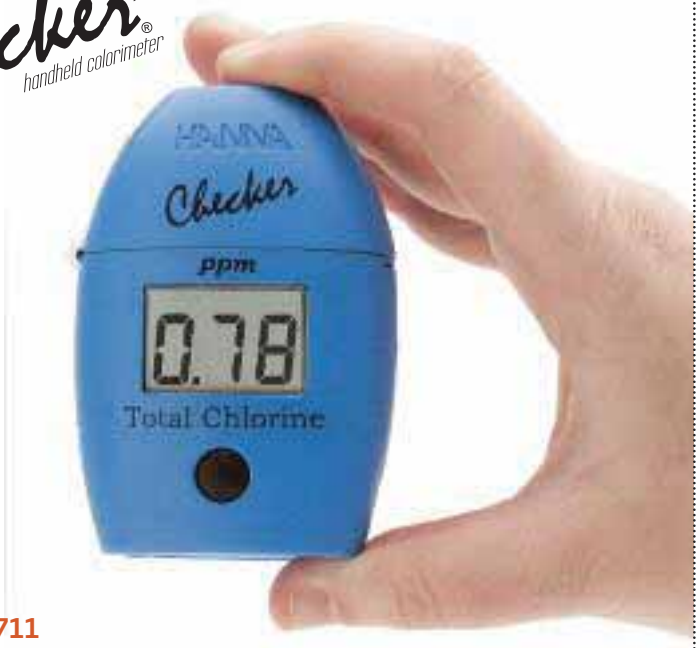
Calcium and sodium hypochlorite are widely used to control waterborne pathogens and algae in irrigation water. We are most familiar with these materials as liquid bleach (sodium hypochlorite) and solid swimming pool "shock" (calcium hypochlorite)

HANNA Options for Measuring Chlorine and ORP

HANNA has a long history of providing a wide range of instrumentation for measuring Chlorine and ORP. They range from portable pH/ORP meters and Chlorine photometers, to in-line sanitation systems that combine the continuous monitoring and controlling of chlorine concentration with the safe validation of ORP monitoring.

Visit www.hannachecker.com for more Checker HC's to measure ions such as Iron and Phosphate.

Checker HC® handheld colorimeter



HI 701 • HI 711

FREE AND TOTAL CHLORINE HANDHELD COLORIMETERS

Easier to use and more accurate than chemical test kits

- EPA approved DPD method
- Large, easy to read digits
- Auto shut-off

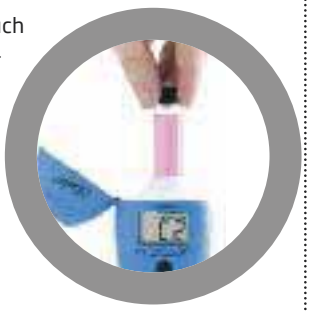
Dedicated to a single parameter

- Works with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small Size, Big Convenience

- The Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: Zero and Measure
- Operated by a single AAA battery

The monitoring of chlorine is crucial in applications such as fruit and vegetable sanitation and disinfection. By monitoring this crucial parameter, serious health and safety risks can be avoided.



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

See Page 34 for more information on measurement.

SPECIFICATIONS	HI 711 (Total Chlorine)	HI 701 (Free Chlorine)
Range	0.00 to 3.50 ppm (mg/L)	0.00 to 2.50 ppm (mg/L)
Resolution	0.01 ppm (mg/L)	
Accuracy	±3% of reading ±0.03 ppm (mg/L) @ 25°C	
Battery Type	(1) 1.5V AAA	

ORDERING INFORMATION

HI 711 Checker®HC is supplied with (2) sample cuvettes with caps, (6) powder reagents for Total Chlorine, battery and instructions.

HI 701 Checker®HC is supplied with (2) sample cuvettes with caps, (6) powder reagents for Free Chlorine, battery and instructions.

REAGENTS AND STANDARDS

HI 711-25	Reagents for 25 tests (Total Cl_2)
HI 701-25	Reagents for 25 tests (Free Cl_2)

ACCESSORIES

HI 731318	(4) Cuvette cleaning cloth
HI 731321	(4) Glass cuvettes
HI 731225	(4) Caps for cuvettes
HI 93703-50	Cuvette cleaning solution, 230 mL

HI 96711 • HI 96734

FREE AND TOTAL CHLORINE PHOTOMETERS

- CAL CHECK™
- Large, dual-level LCD
- Water-resistant
- Accuracy verification
- User calibration
- Certified calibration and verification standards
- Secondary standards for calibration and verification
- BEPS (Battery Error Prevention System)
- READ/TIMER function
- Auto shut-off
- Calibration Date on Display

SPECIFICATIONS		HI 96711 FREE AND TOTAL CHLORINE	HI 96734 UHR FREE AND TOTAL CHLORINE
Range	Free Chlorine	0.00 to 5.00 mg/L (ppm)	0.00 to 10.00 mg/L (ppm)
	Total Chlorine	0.00 to 5.00 mg/L (ppm)	0.00 to 10.00 mg/L (ppm)
Resolution		0.01 mg/L (0.10 mg/L over 3.50 mg/L) (ppm)	0.01 mg/L (0.10 mg/L above 3.50 mg/L) (ppm)
Accuracy		±0.02 mg/L @ 1.00 mg/L (ppm)	±0.06 mg/L to 3.00 mg/L (ppm)
Power Supply		(1) 9V battery	
Method		Adaptation of the USEPA method 330.5 and Standard Method 4500-Cl G.	

ORDERING INFORMATION

HI 96711 and **HI 96734** is supplied with (2) sample cuvettes with caps, 9V battery and instructions.

CAL CHECK™ standards and reagents sold separately

REAGENTS AND STANDARDS

HI 96711

HI 93701-01 Reagents for 100 tests (Free Cl_2)
HI 93701-03 Reagents for 300 tests (Free Cl_2)
HI 93711-01 Reagents for 100 tests (Total Cl_2)
HI 93711-03 Reagents for 300 tests (Total Cl_2)
HI 95701-11 CAL CHECK™ Standard Cuvettes for Free Cl_2 (1 set)
HI 95711-11 CAL CHECK™ Standard cuvettes for Total Cl_2 (1 set)

HI 96734

HI 93701-01 Reagents for 100 tests (Free Cl_2)
HI 93701-03 Reagents for 300 tests (Free Cl_2)
HI 93734-01 Powder reagents for 100 tests (Free or Total Cl_2)
HI 93734-03 Powder reagents for 300 tests (Free or Total Cl_2)
HI 95734-11 CAL CHECK™ Standard cuvettes

HI 991003

pH, pH-MV, ORP/ TEMPERATURE METER

- **Sensor Check™** Electrode status check
- **Waterproof**
- **Multi-level LCD Display**
- **HOLD button** Freezes readings on display
- **Automatic Temperature Compensation**
- **Automatic 1 or 2 Point Calibration**
- **BEPS** (Battery Error Prevention System)
- **Battery % displayed on startup**.
- **Flat tip pH/temperature electrode with titanium body and mini pre-amplifier**
- **Bottom probe connection**
  Assures the cable doesn't get in your way

HI 991003 incorporates our Sensor Check™ feature that allows users to determine electrode status at any time.

The HI 1297D pH electrode features a recessed flat tip that is easy to clean and prevents solids in solutions from collecting on the sensor.

Updated!

- **Protective Rubber Boot**

SPECIFICATIONS		HI 991003
Range	pH	-2.00 to 16.00 pH
	pH-mV	±825 mV (pH-mV)
	ORP	±1999 mV
	Temperature	-5.0 to 105.0°C/ 23.0 to 221.0°F
Resolution	pH	0.01 pH
	pH-mV	1 mV
	ORP	1 mV
	Temperature	0.1°C/0.1°F
Accuracy (@20°C)	pH	±0.02 pH
	pH-mV	±1 mV
	ORP	±2 mV
	Temperature	±0.5°C (up to 60°C); ±1.0°C (outside); ±1.0°F (up to 140°F); ±2.0°F (outside)
Battery Type		(3) 1.2V AAA

ORDERING INFORMATION

HI 991003 is supplied with pH/ORP/temperature electrode, starter set of calibration and cleaning solution sachets, batteries, instructions and hard carrying case.

ELECTRODES

HI 1297D Pre-amplified pH/ORP electrode with built-in temperature sensor, DIN connector and 1 m (3.3') cable

ACCESSORIES

HI 710023 Orange protective rubber boot
HI 710024 Blue protective rubber boot

orp

In some applications, ORP can be used to determine the effects of soil compaction and the viability of the soil to maintain the proper level of oxygen.

ORP

ORP stands for oxidation reduction potential. ORP is a reading in millivolts that provides a measurement of the sample's ability to oxidize (or sanitize) contaminants. Water ionizers are intended to raise the alkalinity of your tap water to counteract the in-take of acids. The water sample should show a negative ORP value after the ionization process has been applied to your water.

ORP Preparation and Measurement

1) Remove the protective cap. Visible residue from salt deposits is common. Rinse off any deposits with water.
2) For faster response times, treat the ORP platinum (metal) surface prior to use by soaking it in pre-treatment solution for 15 minutes. Generally use HI 7092M Oxidizing pre-treatment solution when planning on measuring +mV ORP readings. If you are planning on measuring -mV ORP readings, use HI 7091M reducing pre-treatment solution.
3) If pre-treatment is not performed, the electrode will take significantly longer time to respond. Additionally, the recently pre-treated electrode (metal) surface will dissolve off over time so it will have to be restored by future pre-treatments.
4) To measure ORP, immerse the tip of the tester in the sample, stir gently and wait for the reading to stabilize.

HI 98121
pH/ORP TESTER

- Waterproof and floating
- HANNA's exclusive cartridge pH electrode
- Extendable cloth pH junction
- Dual-level LCD
- Automatic Temperature Compensation
- Automatic Calibration
- Battery % level at startup and stability indicator
- HOLD button to freeze readings on the display
- Negative ORP measurements require extra cleaning to remove electrolyte deposits

Please see our cleaning solutions in the back of this catalog

SPECIFICATIONS		HI 98121
Range	ORP	± 1000 mV
	pH	-2.00 to 16.00 pH
	Temperature	-5.0 to 60.0°C / 23.0 to 140.0°F
Resolution	ORP	1 mV
	pH	0.01 pH
	Temperature	0.1°C / 0.1°F
Accuracy (@20°C)	ORP	±2 mV
	pH	±0.05 pH
	Temperature	±0.5°C / ±1°F
Battery Type		(4) 1.5V

ORDERING INFORMATION

HI 98121 (ORP/pH) is supplied with pH electrode, electrode removal tool and batteries.

ELECTRODES

HI 73127 Spare pH electrode

- Any System Can be Cost Effectively Monitored 24 Hours A Day!

Accurate and Simple to Install

Our line of simple-to-operate controllers have been specially designed for agricultural applications including hydroponics or applications where space or cost are a major concern. Thanks to their compact size, they can be mounted in confined spaces and right next to tanks or vats. The low cost of these meters will make it possible for processes that were manually maintained to be controlled automatically, saving considerable time and money.

BL 932700
ORP MINI CONTROLLER

- Fire retardant casing
- Approximately 3.3 x 2.1 x 3.9"
- Large LCD
- Selectable overdose protection system and control override
- External disable feature
- Matching pin connection
- 4-20 mA recorder output

Don't forget–you can fit these controllers into our NEMA boxes!

SPECIFICATIONS	BL 932700
Range	±1000 mV
Resolution	1 mV
Accuracy (@20°C/68°F)	±5 mV
Dosing Relay	1, max 2A (fuse protected), 250 Vac, 30 Vdc
Dosing Selection	reducing or oxidizing contact open=reducing dosage, activated when reading exceeds setpoint value; contact closed=oxidizing dosage, activated when reading falls below setpoint value

ORDERING INFORMATION

BL 932700-0 (12 Vdc) and **BL 932700-1** (115/230 Vac) are supplied with mounting brackets, transparent protective cover and instruction manual.

PROBES

HI 2001 ORP electrode for continuous flow-thru monitoring

GENERAL ACCESSORIES

HI 740146 Mounting brackets

HI 9912
pH & ORP DIGITAL CONTROLLER

with Proportional Control

- 2 user adjustable setpoints
- Automatic temperature compensation
- 2 point calibration
- Alarm relay
- Proportional control

HI 9912 is a pH and ORP controller specially designed for sanitization. Two separate setpoints can be user-adjusted from 6 to 8 pH and 500 to 900 mV. The relays are activated when the pH exceeds or the mV falls below the relevant setpoint. HI 9912 accepts any pH and ORP electrode ending in a universal BNC connector. Two independent terminals provide for pH and ORP ground probes to extend electrode life and eliminate interference.

HANNA's proportional control allows considerable savings by minimizing the use of chemicals. The settings are made through independent time cycles adjustable from 0 to 90 seconds and two proportional bands from 0 to 200 mV and 0 to 2 pH. Two pumps or electro-valves can be wired directly to the controller and be powered through the terminal.

ORDERING INFORMATION

HI 9912 is supplied complete with instructions.

Choose your Configuration:

HI 9912 - ☐

1 = 115 Vac power supply
2 = 230 Vac power supply

SOLUTIONS

HI 7004/1L	pH 4.01 buffer solution, 1 L
HI 7007/1L	pH 7.01 buffer solution, 1 L
HI 7010/1L	pH 10.01 buffer solution, 1 L
HI 7020L	200-275 mV test solution, 500 mL
HI 7021L	240 mV test solution, 500 mL
HI 7022L	475 mV test solution, 500 mL

SPECIFICATIONS	HI 9912
Range	0.00 to 14.00 pH; 0 to 1000 mV
Resolution	0.01 pH; 1 mV
Accuracy (@20°C/68°F)	±0.02 pH; ±5 mV
Dosing Contact	powered terminals for pH and ORP corrections (240V) Max. 2A, 1,000,000 strokes pH dosage: activated when pH > setpoint; ORP dosage: activated when mV < setpoint
Alarm Relay	activated when pH varies more than a selectable value (0.5 to 2.5 pH) from setpoint or when max dosage time for pH (adjustable from 1 to 10 minutes) elapses; or activated when mV reading varies more than a selectable value (50 to 250 mV) from setpoint or when max dosage time for ORP (adjustable from 1 to 10 minutes) elapses
Power Supply	110/115 Vac ±10% or 220/240 Vac ±10%; 50/60 Hz

HI SANI
GREENHOUSE AND AGRICULTURE SANITATION SYSTEMS

- Purify recycled irrigation water with excellent results
- Clean algae growing on walls, benches and surfaces
- Sanitize produce
- Safe levels of chlorine from 0.00-5.00 ppm is assured
- Constant monitoring of pH,ORP and temperature
- Utilizes low cost, readily available sanitizers
- Data logging and transfer
- Alarm capacity
- Sanitization reports can be generated

Constant Monitoring with a Simple, Proven Method

Chlorine is a common and effective sanitizer for reducing harmful bacteria such as salmonella, pythium and e. coli. The HI SANI chlorination system utilizes inexpensive, convenient and easy to use sodium hypochlorite or chlorine gas.

To ensure proper control, HANNA has linked two control systems. One system controls the volume of the sanitizer from 0.00 to 5.00 ppm, the other is a function of ORP (oxidation reduction potential).

ORP lets you to determine if the sanitation occurring is safe and adequate.

Summary of results from various lab simulation and commercial hydrocooler survey studies

	Survival at ORP (mV)		
Pathogen/Indicator	< 485	550 x < 620	> 665
E.coli 0157:H7	> 300 s	< 60 s	< 10 s
Salmonella spp.	> 300 s	> 300 s	< 20 s
L. monocytogenes	> 300 s	> 300 s	< 20 s
Thermotolerant coliform	> 48 h	> 48 h	< 30 s

ORDERING INFORMATION

HI SANI Contact your local HANNA representative for more information.

HI 1222
Dual Controller Capability NEMA Enclosure

HI 1211
Single Controller Capability NEMA Enclosure

HI 1211 • HI 1222
CONTINUOUS pH (ACID) AND EC/TDS (FERTILIZER) MONITORING AND CONTROLLING SYSTEMS.

- **Combine pH with an EC controller for continuous monitoring**
- **NEMA protection**
- **Simple to Install - plug in probe, power & relay meter**

HANNA offers a wide range of in-line solutions that allows growers the ability to continuously monitor and if desired control the pH (acid) and EC (fertilizer). These controllers will allow any system to be cost effectively monitored 24 hours a day.

ORDERING INFORMATION

HI 1222 Dual controller NEMA box
HI 1211 Single controller NEMA box

BL 931700
pH MINI CONTROLLER

with 4-20 mA Recorder Output

SPECIFICATIONS	BL 931700
Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy (@20°C/68°F)	±0.02 pH

ORDERING INFORMATION

BL 931700-0 (12 Vdc) and **BL 931700-1** (115/230 Vac)

PROBES

HI 1001 pH electrode for continuous flow-thru monitoring

BL 981411
pH MINI CONTROLLER

SPECIFICATIONS	BL 981411
Range	0.0 to 14.0 pH
Resolution	0.1 pH
Accuracy (@20°C/68°F)	±0.1 pH

ORDERING INFORMATION

BL 981411-0 (12 Vdc) and **BL 981411-1** (115/230 Vac)

PROBES

HI 1001 pH electrode for continuous flow-thru monitoring

BL 983327
EC MINI CONTROLLER

SPECIFICATIONS	BL 983327
Range	0.00 to 10.00 mS/cm
Resolution	0.01 mS/cm
Accuracy (@20°C/68°F)	±2% f.s.

ORDERING INFORMATION

BL 983327-0 (12 Vdc) and **BL 983327-1** (115/230 Vac)

PROBES

HI 7632-00 EC/TDS probe with internal temperature sensor and 2 m cable

BL 7916
pH CONTROLLER AND PUMP

Black Stone

- **±0.01 pH accuracy and high performance**
- **Proportional, Acid or Base and user selectable dosing**
- **Proportional dosing slows the pump down when the measured pH level approaches the set value ensuring precise dosing and avoiding over dosage.**
- **Alarm contact is activated whenever the pH value varies more than 2 pH units from the set point.**
- **Isolated 4 to 20 mA recorder output.**
- **Auxiliary contacts to attach a mixer or priming pump that activates only when pump is dosing.**
- **Use in vegetable dunk tank to assure and verify sanitation for GAP compliance**

ORDERING INFORMATION

BL 7916-1 (110/115V) and **BL 7916-2** (220/240V) are supplied with discharge and suction valves, polyethylene tubing, power cable and instructions.

PRESSURE (BAR)	FLOW RATE (LPH)
0.5	13.3
1.0	11.7
2.0	10.1
3.0	9.0
4.0	7.8

ACCESSORIES

HI 721101	Pumphead, O-ring and screws
HI 721102	Discharge valve assembly
HI 721103	Suction valve assembly
HI 721004	Injection valve assembly (required)
HI 721005	Foot valve assembly (required)
HI 721008	Ceramic weight (4 pcs.)

SPECIFICATIONS	BL 7916
Range	0.00 to 14.00 pH
Resolution	0.01 pH
Accuracy (@20°C/68°F)	±0.01 pH

HI 9935
pH & TDS DIGITAL CONTROLLER

with Proportional Control for Fertigation

- 2 user adjustable setpoints
- Automatic temperature compensation
- 2 point calibration
- Alarm relay

HI 9935 is a pH and TDS controller for fertilizer solution dosage in hydroponics. Two separate setpoints can be user-adjusted from 4 to 7 pH and 900 to 1800 ppm (mg/L). The relays are activated when the pH exceeds the setpoint or TDS falls below the desired value. Two pumps or electro-valves can be wired directly to the controller and be powered through the terminals. Independent proportional settings for pH and TDS can be adjusted from 0 to 90 seconds, 0 to 2.0 for pH and 0 to 400 mg/L (ppm) for TDS. A ground probe can be connected to the appropriate terminals to extend electrode life and eliminate interference.

pH electrodes with a BNC connector and TDS probes with a DIN connector are accepted.

SPECIFICATIONS	HI 9935
Range	0.00 to 14.00 pH; 0 to 1999 ppm (mg/L)
Resolution	0.01 pH; 1 ppm (mg/L)
Accuracy (@20°C/68°F)	±0.02 pH; ±2% F.S.
TDS Conversion Factor	0.65 mg/L (ppm) = 1 µS/cm
Dosing Contact	powered terminals for pH and TDS corrections (240 V) Max. 2A, 1,000,000 strokes activated when pH > setpoint and TDS reading < setpoint, respectively
Alarm Relay	activated when pH varies more than a selectable value (0.5 to 2.5 pH) from setpoint or when max dosage time for pH (adjustable from 1 to 10 minutes) elapses; or when TDS differs more than a selectable value (50 to 450 mg/L (ppm) from setpoint or when max dosage time for TDS (adjustable from 1 to 10 minutes) elapses(isolated, Max 2A-240 V, resistive load, 1,000,000 strokes)

ORDERING INFORMATION

HI 9935 is supplied complete with instructions.

Choose your Configuration:

HI 9935 - ☐

1 = 115 Vac power supply
2 = 230 Vac power supply

PROBES

HI 3001D Conductivity probe for in-line or submersion applications

SOLUTIONS

HI 7004/1L pH 4.01 buffer solution, 1 L
HI 7007/1L pH 7.01 buffer solution, 1 L
HI 70442L 1500 mg/L (ppm) calibration solution, 500 mL

HI 9913
INDUSTRIAL GRADE pH & CONDUCTIVITY DIGITAL CONTROLLER

with Proportional Control for Fertigation

- 2 user adjustable setpoints
- Automatic temperature compensation
- 2 point calibration
- Alarm relay

HI 9913 is a 2-in-1 pH and conductivity controller engineered for dosage of fertilizer solutions in hydroponics.

HI 9913 accepts pH electrodes with BNC and conductivity probes with DIN connectors.

SPECIFICATIONS	HI 9913
Range	0.00 to 14.00 pH; 0.00 to 10.00 mS/cm
Resolution	0.01 pH; 0.01 mS/cm
Accuracy (@20°C/68°F)	±0.02 pH; ±2% F.S.
Dosing Contact	powered terminals for pH and EC dosages (240V) Max. 2A, 1,000,000 strokes activated when pH > setpoint and when mS reading < setpoint, respectively
Alarm Relay	activated when pH varies more than a selectable value (0.5 to 2.5 pH) from setpoint or when max dosage time for pH (adjustable from 1 to 10 minutes) elapses; or when conductivity varies more than a selectable value (0.5 to 2.5 mS/cm) from setpoint or when max dosage time for EC (adjustable from 1 to 10 minutes) elapses (isolated, Max 2A-240 V, resistive load, 1,000,000 strokes)

ORDERING INFORMATION

HI 9913 is supplied complete with instructions.

Choose your Configuration:

HI 9913 - ☐

1 = 115 Vac power supply
2 = 230 Vac power supply

PROBES

HI 3001D Conductivity probe for in-line or submersion applications

SOLUTIONS

HI 7004/1L pH 4.01 buffer solution, 1 L
HI 7007/1L pH 7.01 buffer solution, 1 L
HI 7031L 1413 µS/cm calibration solution, 500 mL
HI 7039L 5000 µS/cm calibration solution, 500 mL

HI 9914

FERTIGATION DIGITAL CONTROLLER

for Agricultural Process Control Requirements

HI 9914 is a wall mounted fertigation controller designed to meet specific process control requirements in agricultural, horticultural and hydroponics applications.

The controller includes two regulators for pH and conductivity, that can be adjusted from the front panel by setting two independent thresholds. The conductivity and pH controls are time separated and a timed operation mode to avoid overdosing of fertilizer or acid. The controller status is indicated by LEDs on the front panel. Moreover, the equipment is provided with a three-level sensor, to control the water level, the alarm condition and irrigation sequences.

The instrument also features an alarm system, which is activated when an unusual working condition occurs. A humidity detector can be used to stop the controller if any leakage is detected. Water nozzle, circulation pump, feeding pump and alarm are equipped with relays.

SPECIFICATIONS	HI 9914
Range	0.00 to 10.00 mS/cm; 0.00 to 14.00 pH
Resolution	0.01 mS/cm; 0.01 pH
Accuracy (@20°C/68°F)	±5% F.S.; ±0.02 pH

ORDERING INFORMATION

HI 9914 is supplied complete with instructions.

Choose your Configuration:

HI 9914 - ☐

1= 115 Vac power supply
2= 230 Vac power supply

PROBES

HI 3003D	Conductivity probe for in-line or submersion applications

SOLUTIONS

HI 7004L	pH 4.01 buffer solution, 500 mL
HI 7007L	pH 7.01 buffer solution, 500 mL
HI 7031L	1.41 mS/cm cal. solution, 500 mL
HI 7039L	5.00 mS/cm calibration solution, 500 mL

BL Series

CHEMICAL DOSING PUMPS

- **Ideal for dosing nutrients and acids**
- **Designed for all environments**
- **Solenoid driven, minimum moving parts used**
- **Vertical or horizontal mounting**
- **Single control operation**
- **Affordable**
- **High Quality Materials**

Blackstone pumps are supplied with the highest quality material as standard equipment– not optional. The diaphragm utilizes one-piece construction of PTFE that, unlike conventional laminated diaphragms, stands up to the test of time and wear.

Ball valves are constructed in glass. The pumphead and O-rings are made of PVDF, PTFE and FPM/FKM which offer unsurpassed resistance even to the most aggressive chemicals.

Blackstone pumps are more accurate than standard pumps due to the positive displacement design ensuring each stroke is identical to the strokes before and after it, thus keeping the flow rate consistent.

A wide range of Blackstone pumps with different dosing capacities are available for your specific needs. Each pump is supplied with discharge and suction valves.

SPECIFICATIONS	BL SERIES
Max Output	see table below
Pump Casing	fiber-reinforced polypropylene
Materials	pumphead in PVDF, diaphragm in PTFE, glass ball valves and O-rings in FPM/FKM polyethylene 5 x 8 mm tubing and 3/8" injection fitting
Power Supply	110/115 Vac (-1 models) or 220/240 Vac (-2 models), 50/60Hz
Protection	IP65

PART NUMBER	MAX OUTPUT LPH	RATED PRESSURE BAR	DOSING FREQUENCY STROKES/MIN
WITH LARGE DIAPHRAGM			
BL 20	18.3	0.5	120
BL 15	15.2	1	120
BL 10	10.8	3	120
BL 7	7.6	3	120
WITH SMALL DIAPHRAGM			
BL 5	5.0	7	120
BL 3	2.9	8	120
BL 1.5	1.5	13	120

ORDERING INFORMATION*

-1 models utilize a 110/115 Vac power supply
-2 models utilize a 220/240 Vac power supply

BL 1.5-1 and **BL 1.5-2**	1.5 LPH flow rate
BL 3-1 and **BL 3-2**	2.9 LPH flow rate
BL 5-1 and **BL 5-2**	5.0 LPH flow rate
BL 7-1 and **BL 7-2**	7.6 LPH flow rate
BL 10-1 and **BL 10-2**	10.8 LPH flow rate
BL 15-1 and **BL 15-2**	15.2 LPH flow rate
BL 20-1 and **BL 20-2**	18.3 LPH flow rate

ACCESSORIES

HI 721101	Pumphead, O-ring and screws
HI 721102	Discharge valve assembly
HI 721103	Suction valve assembly
HI 721004**	Injection valve assembly
HI 721005**	Foot valve assembly
HI 721008	Ceramic weight (4 pcs.)

** Required for operation

1. Fertilizer and acid injection indicators (LEDs)
2. Main pump and alarm indicators (LEDs)
3. Multiple zone valve indicators (LEDs)
4. Waterproof NEMA 4X casing
5. Multiple connection ports
6. Up to 62 selectable "screens" for readouts and programming
7. Touch keypad
8. Quick reference guide

HI 8000 Series
ACID INJECTION/pH CONTROL SYSTEMS

True pH and Alkalinity control solutions for variable flow greenhouse irrigation

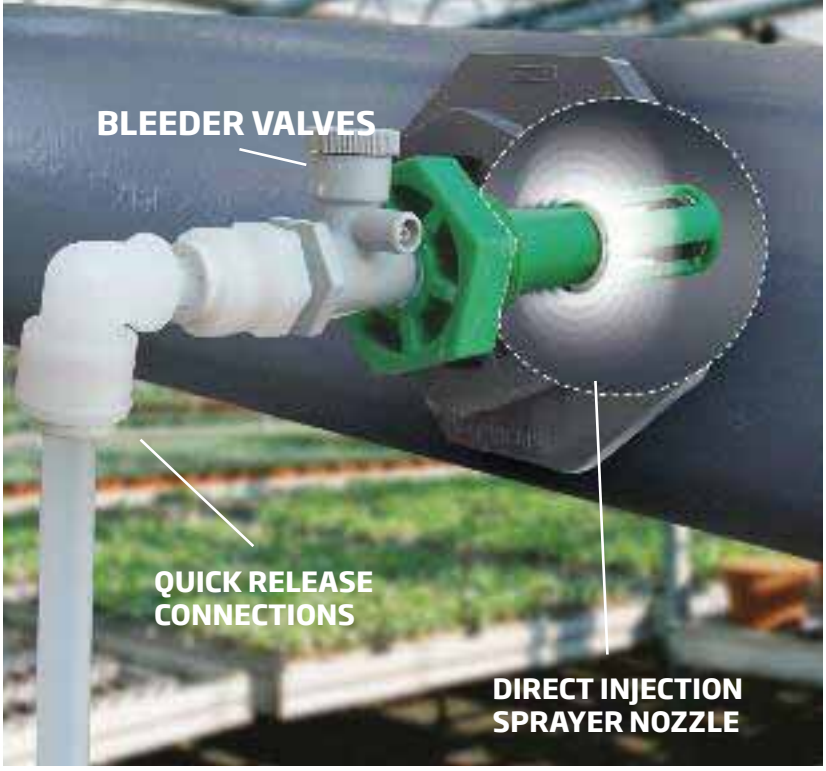
Advanced features of HANNA's HI 8000 Series Controllers:

- **Free installation and start up**
- **Combined pH and flow control technology**
- **Multiple measuring point monitoring and control from the point of injection to the point of delivery – all from one central controller**
- **Precise fertilizer control with multiple point EC monitoring**
- **Automatic time or volume control from 8 to 32 zones (solenoid valves)**
- **10 easy to use programs for a variety of crops and irrigation timetables**
- **Programmable starts for "hand watering" or time scheduled activation**
- **Multiple alarm settings to provide maximum safety and reliability**
- **PC interface capability for remote monitoring and control**
- **Fully upgradeable to a 4 fertilizer injection control system**
- **Maintains selected pH within fluctuating alkalinity and flow rates**
- **2 year warranty on the HI 8000 Controller and free unlimited technical support**

HANNA instruments®, the world's leader in pH technology has worked with leading greenhouses to develop advanced system solutions for covered crops of any type. Each system can precisely control pH and alkalinity from 3GPM up to 200GPM. Incorporating combined pH and flow control technology, the HANNA solution offers features and functionality found no where else in the industry.

Each system can be installed in-tank or directly in-line and is custom configured and programmed to meet the pH and alkalinity requirements of any greenhouse–any crop!

the heart
of our acid injection/pH control systems



SPECIFICATIONS	HI 8,000 SERIES (HEAD UNIT)
Range	pH : 0.0 to 14.0; EC: 0.0 to 10.0 mS/cm
Resolution	0.1 pH / 0.1 mS/cm
Accuracy (@20°C/68°F)	pH: ±0.0546; EC: ±0.078 mS/cm
Typical Inputs	2 pH electrodes, 3 conductivity probes, 4 fertilizer tanks, 1 acid tank, 5 tank level controls, 1 mixing tank level control, 2 differential pressures, 1 irrigation counter, 1 temporary break, 1 conditional stoppage
Typical Outputs	2 non-consent alarms, up to 32 zone valves, 2 filter flushing, pump, agitator, 4 fertilizer tank electro-valves, 1 pH tank electro-valve
Number of Programs	10
Program Method	With keypad or through a PC using proprietary software
Irrigation Capacity	1, 4, 8 and 32 zone valves
Irrigation Control	time/volume control, 1 to 6 different timetables per program,

Acids Used for Irrigation Water Acidification

Type of Acid	Specific Gravity	Amount of acid per 100 gallons needed to remove 1 ppm $CaCO_3$ of alkalinity	Nutrients added with 1 fluid ounce of acid per gallon
75% Phosphoric	1.58 grams/ml	0.021 fl.oz.	32 ppm P
85% Phosphoric	1.69 grams/ml	0.017 fl.oz.	36 ppm P
35% Sulfuric	1.26 grams/ml	0.028 fl.oz.	11 ppm S
93% Sulfuric	1.83 grams/ml	0.007 fl.oz.	30 ppm S
61% Nitric	1.38 grams/ml	0.019 fl.oz.	17 ppm N

Ex.: The amount of 85% phosphoric acid per 100 gallons of water needed to remove 200 ppm $CaCO_3$ of alkalinity.

Alkalinity removed (in ppm $CaCO_3$)	x	Fluid ounces of acid to remove 1 ppm alkalinity	=	Total fluid ounces of acid
200	x	0.017	=	3.4 fl.oz.

Ex.: The concentration of phosphorus (in ppm P) added when 3.4 fluid ounces of phosphoric acid per 100 gallons is added

Volume of acid added (in fluid ounces)	x	Nutrients supplied with the addition of 1 fluid ounce per 100 gallons	=	Amount of P added
3.4	x	36	=	122 ppm P

ORDERING INFORMATION

Contact your nearest HANNA for more information on how the HI 8,000 can benefit your greenhouse.

Choose your Configuration:

HI 800 □ - □ □ □ □ □

Mount Style
1: panel mounted
2: wall mounted

Number of sectors
01: 8 sectors
04: 32 sectors

Firmware language
00: English
01: Spanish
02: Italian
03: Portuguese
04: Dutch
05: French
06: Greek
07: Arabic

Power Supply
U: 115 Vac
D: 230 Vac

REQUIRED ACCESSORIES

HI 98143-22 pH/EC isolated transmitter, non-sourcing current type with 4-20 mA output (2 required)

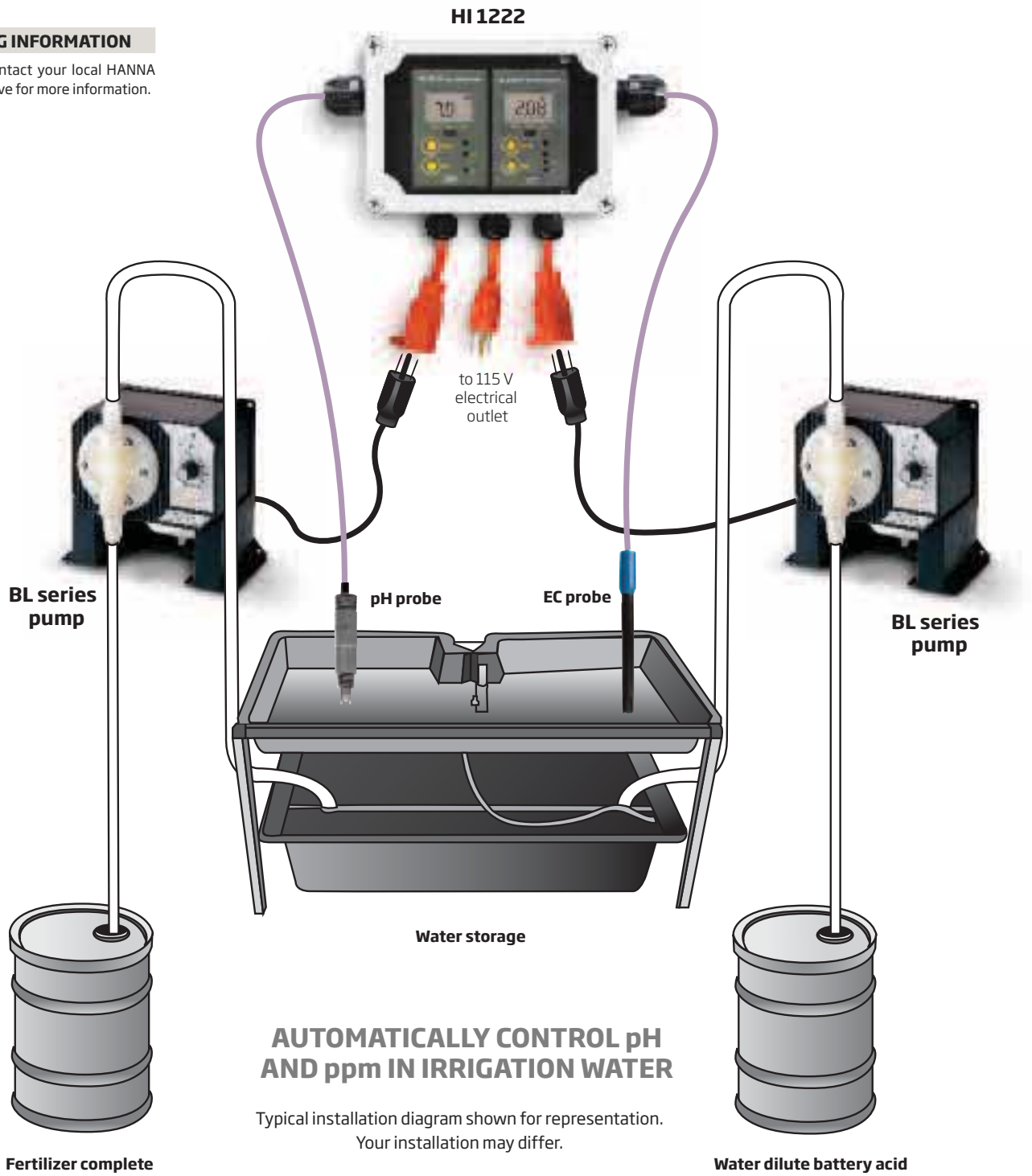
ACCESSORIES

HI 60542 2" NPT in-line PVC and ORP electrode holder ideal for installation directly in pipes. The HI 60542 has been designed specifically to be used with HANNA's 3/4" process pH and ORP electrodes.

HI 2500
MINI CONTROLLER FERTIGATION SYSTEM

ORDERING INFORMATION

HI 2500 Contact your local HANNA representative for more information.



AUTOMATICALLY CONTROL pH AND ppm IN IRRIGATION WATER

Typical installation diagram shown for representation. Your installation may differ.

custom
control & injection systems

HI 5000
MINI FERTIGATION SYSTEM

- **0 - 25 GPM flow rate (w/55 gal mix tank)**
  Higher flow rates are obtainable when utilizing a larger mix tank and pump.
- **Supplied with 2 isolated electro-valve injectors and 3 fertilizer connections.**
- **Independent EC and pH control functions**
  (see HI9913 and HI9935 instruction manuals for complete controller specifications).
- **Supplied with 3 sets of suction tubing and foot valves for fertilizer connections.**
- **Supplied with Acid dosing pump connected directly to the system (no hook up required)**
- **Main input and output can be connected to hose fittings for quick "plug and play" assembly.**
- **Equipped with a venturi injector... no moving parts!**
- **Visual flow meter for easy fertilizer flow adjustments**

The HI 5000 is an all-in-one, ready to use control system. Compact and versatile, the Mini Fertigator brings precision nutrient and acid control to professional grower and advanced home grower alike.

The Mini Fertigator is easy to install and comes completely pre-assembled. To install the unit, simply attach two pipes and plug into the power cord. No wiring or no assembly!

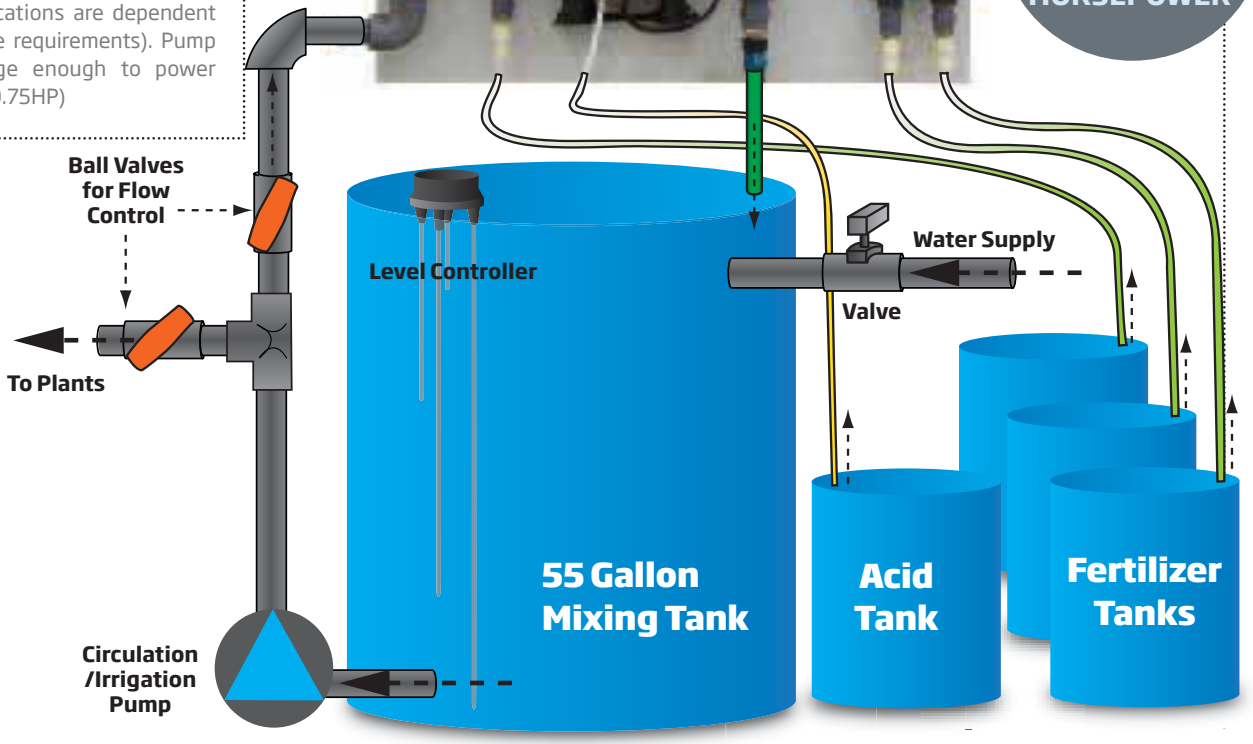
To inject nutrients, the mini Fertigator uses a venturi so there are no high-maintenance peristaltic pumps to worry about. HANNA's included Blackstone pump can handle full-strength acid, so there is no need to risk an accident with dilution. HANNA's flat-tipped probes are also highly resistant to fouling and clogging.

The automated dosing feature allows growers to optimize growth without spending half the time measuring, mixing and dosing. The Mini Fertigator allows growers to set precision dosing during vegetative and fruiting stages, maximizing harvest and profit

HI 5000 Typical Installation Diagram

- **Mixing tank, level controller, fertilizer tanks, circulator pump and related plumbing not included.**
- **Circulation/Irrigation Pump**
  Recommend 0.75HP end-suction centrifugal pump (pump size and power specifications are dependent on greenhouse requirements). Pump MUST be large enough to power injector. (MIN 0.75HP)

WORKS WITH CIRCULATOR PUMPS AS SMALL AS .75 HORSEPOWER



HI 10,000 Series

FERTIGATION SYSTEMS FOR IRRIGATION, FERTILIZATION, pH AND EC CONTROL

HI 10,000 Series Overview

complete greenhouse fertigation control

Powerful Features

- **Accurate control** –via continuous EC and pH monitoring
- **8 to 300 GPM** –flow rate range
- **65 to 75 PSI** –operating range
- **Bypass system** –unit does not interfere with main line flow
- **3 fertilizer injectors and 1 minor or (mild) acid**
- **Make your own combination fertilizer** –Each fertilizer can be set to a specific percent. Ex: Injector #1 (N = 20%), Injector #2 (P = 10%), Injector #3 (K = 20%)
- **10 programs** –for various EC and pH set-points and fertilizer percentages
- **Save money on fertilizer usage**
- **Optimize the nutrients to your plants**
- **Control over 32 valves** –Valves can be controlled sequentially, or x 2, x 3 ...up to x 8 at once
- **Programs can be triggered by time, external switching, and/or flow**
- **Flow activated** –to allow for spot watering, timer adjustable
- **Control agitators and filter cleaning**
- **Alarm Control and Redundant Monitoring**
- **GSM compatible** –for remote monitoring and control from PC

HANNA,a world leader in EC and pH control technology has worked with leading growers to develop advanced system solutions for crops of any type. The HANNA Fertigation System provides precise control of pH and fertilizer injection. Unlike flow driven systems of the past, the HANNA Fertigation System constantly measures the actual EC and pH of the water, allowing the system to add the precise concentration of fertilizer directly to the irrigation supply. The HANNA System is a bypass system which does not limit line flow or pressure. This allows the user to accurately inject fertilizer from 5 GPM up to 300 GPM.

The HI 8000 series controller included with the system has 10 programs that allow the user to set various EC and pH values for a variety of plants. Each system allows the injection and mixing of up to 4 fertilizers. If preferred, each fertilizer injector can be set to a specific percent, allowing the user to mix combination fertilizers from basic N - P - K elements, providing a considerable cost savings. The HANNA Fertigation System also controls up to 32 irrigation valves for complete automation of the fertigation process.

SPECIFICATIONS	HI 10,000 CONTROLLER (HEAD UNIT)
Range	pH : 0.0 to 14.0; EC: 0.0 to 10.0 mS/cm
Resolution	0.1 pH / 0.1 mS/cm
Accuracy (@20°C/68°F)	pH: ±0.0546; EC: ±0.078 mS/cm
Typical Inputs	2 pH electrodes, 3 conductivity probes, 4 fertilizer tanks, 1 acid tank, 5 tank level controls, 1 mixing tank level control, 2 differential pressures, 1 irrigation counter, 1 temporary break, 1 conditional stoppage
Typical Outputs	2 non-consent alarms, up to 32 zone valves, 2 filter flushing, pump, agitator, 4 fertilizer tank electro-valves, 1 pH tank electro-valve
Number of Programs	10
Program Method	keypad
Irrigation Capacity	1, 4, 8 and 32 zone valves
Irrigation Control	time/volume control, 1 to 6 different timetables per program,

ORDERING INFORMATION

Contact your nearest HANNA for more information on how the HI 10,000 can benefit your greenhouse.

CONTROL PANEL

1. Fertilizer and acid injection indicators (LEDs)
2. Main pump and alarm indicators (LEDs)
3. Multiple zone valve indicators (LEDs)
4. Touch Keypad
5. Backlit LCD

Pro's Choice

HANNA's Fertigation and pH Control Systems can be found in a number of notable greenhouses throughout the USA: Van Wingerden Greenhouses NJ, Gro-Rite NJ, Van Vugt NJ, Michael's Greenhouse CT. Additional installations include such greenhouse leaders such as OVW Greenhouse NJ, and De Groot Greenhouse NJ, Van Wingerden Greenhouses WA.

Quality and Service

The HANNA systems are above all reliable, durable and require little to no maintenance and each unit is backed by impeccable training and support ...just ask our clients!

"We replaced our manual injectors with the HANNA system and are now adding supplemental fertilizers to optimize the nutrients to the plants.

The result is healthier plants and longer shelf life when delivered to our customers".

MARK KELLY
Grower
Grower Direct Farms
CT USA

"Best mums ever since integrating the HANNA system".

MIKE VANDEVREDE
Grower
Gro Rite
Lincoln Park, NJ USA

REFERENCES AVAILABLE UPON REQUEST

TIPS FOR THE MOST ACCURATE MEASUREMENTS

Don't Let Your Electrode Dry Out

Ideally, pH electrodes should be stored in a storage solution when not in use. Placing the electrode in a small glass filled with storage solution is suitable. An option for pocket meters is to place a small piece of sponge into the meter's cap and pouring storage solution into the cap to wet the sponge. Pouring out the excess solution beforehand, the cap can then be placed on the meter.

If a storage solution is not available the next best option is to use pH 4.01 buffer (pH 7.01 is also suitable to a lesser extent).

Clean Your Electrodes Before Use

Clean the liquid junction of your electrodes once a day or at least once a week to prevent junction clogging and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15-20 minutes.

HANNA offers a wide range of cleaning solutions, for general purpose and specific applications.

Replace Your Electrode Once a Year, Solutions Once a Month

If your electrode takes too long to stabilize a reading or readings fluctuate wildly, it is probably time to replace the electrode. 6 months to 1.5 years is the typical life span of any pH electrode.

Change your solutions once a month to avoid erroneous calibrations or measurements due to age or contamination. Opening a new HANNA sachet guarantees freshness every time.

Solution that is Fresh Every Time

HANNA single-use sachets are a great way to ensure a fresh solution is used every time you calibrate. Just tear open the packet and insert the electrode. These light-tight sachets are also ideal for testers–they fit right in!

Application Specific Cleaning

HANNA has prepared a complete line of cleaning and disinfection solutions that eliminate impurities and residues left on electrode surfaces when immersed in special samples.

BOTTLES		
CODE	**DESCRIPTION**	**SIZE**
HI 70663L	Cleaning Solution for Soil Deposits	500 mL
HI 70663M	Cleaning Solution for Soil Deposits	250 mL
HI 70664L	Cleaning Solution for Humus Deposits	500 mL
HI 70664M	Cleaning Solution for Humus Deposits	250 mL
HI 70670L	Cleaning Solution for Salt Deposits	500 mL
HI 70670M	Cleaning Solution for Salt Deposits	250 mL
HI 70671L	Cleaning and Disinfection Solution for Algae, Fungi and Bacteria	500 mL
HI 70671M	Cleaning and Disinfection Solution for Algae, Fungi and Bacteria	250 mL

The fresh and easy to open sachet package is a practical and ideal solution for field measurements.

SACHETS		
CODE	**DESCRIPTION**	**QTY/SIZE**
HI 700661P	General Purpose Cleaning Solution for Agriculture	(25) 20 mL
HI 700663P	Cleaning Solution for Soil Deposits	(25) 20 mL
HI 700664P	Cleaning Solution for Humus Deposits	(25) 20 mL
HI 700670P	Cleaning Solution for Salt Deposits	(25) 20 mL
HI 700671P	Cleaning and Disinfection Solution for Algae, Fungi and Bacteria	(25) 20 mL

General Use Cleaning Solutions

Clean the liquid junction of your electrodes once a day or at least once a week to prevent junction clogging and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15-20 minutes.

BOTTLES AND SACHETS		
CODE	**APPLICATION**	**PACKAGE**
HI 70000P	Rinsing	(25) 20 mL sachet
HI 7061L	General Purpose	500 mL bottle
HI 7061M	General Purpose	250 mL bottle

Electrode Storage Solutions

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI 70300 in the protective cap.

BOTTLES		
CODE	**DESCRIPTION**	**SIZE**
HI 70300L	Electrode Storage Solution	500 mL
HI 70300M	Electrode Storage Solution	250 mL

pH Buffer Solutions

HANNA buffer solutions are prepared using precise formulas and are standardized with a pH electrode and meter calibrated with NIST standards.

BOTTLES AND SACHETS

CODE	pH VALUE @25°C	SIZE	PACKAGE
HI 7004L	4.01	500 mL	1 bottle
HI 7004M	4.01	250 mL	1 bottle
HI 70004P	4.01	20 mL	25 sachets
HI 7007L	7.01	500 mL	1 bottle
HI 7007M	7.01	230 mL	1 bottle
HI 70007P	7.01	20 mL	25 sachets
HI 7010L	10.01	500 mL	1 bottle
HI 7010M	10.01	250 mL	1 bottle
HI 70010P	10.01	20 mL	25 sachets

ORP Test and Pretreatment solutions

ORP test solutions allow users to test the precision of ORP electrodes. For example, by immersing the electrode in HI 7020 solution, readings should fall within the 200 to 275 mV range (@20°C/68°F).

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

BOTTLES

CODE	DESCRIPTION	SIZE
HI 7020L	ORP Test Solution at 200/275 mV (@20°C)	500 mL
HI 7020M	ORP Test Solution at 200/275 mV (@20°C)	250 mL
HI 7021L	ORP Test Solution at 240 mV (@20°C)	500 mL
HI 7021M	ORP Test Solution at 240 mV (@20°C)	250 mL
HI 7022L	ORP Test Solution at 470 mV (@20°C)	500 mL
HI 7022M	ORP Test Solution at 470 mV (@20°C)	250 mL
HI 7091L	Reducing Pretreatment Solution	500 mL
HI 7091M	Reducing Pretreatment Solution	250 mL
HI 7092L	Oxidizing Pretreatment Solution	500 mL
HI 7092M	Oxidizing Pretreatment Solution	250 mL

Sample Preparation Solutions

BOTTLES

CODE	DESCRIPTION	SIZE
HI 7051M	Soil Sample Preparation Solution	250 mL
HI 7051L	Soil Sample Preparation Solution	500 mL

Dissolved Oxygen Solutions

BOTTLES

CODE	DESCRIPTION	SIZE
HI 7040M	Zero oxygen solution	250 mL
HI 7040L	Zero oxygen solution	500 mL
HI 7041S	Electrolyte solution for polarographic DO probes	30 mL
HI 7042S	Electrolyte solution for galvanic probes	30 mL

Conductivity Calibration Solutions

84 µS/cm solution makes it possible to calibrate instruments with a conductivity scale of up to 200 µS/cm.

The **1413 µS/cm** solution is best suited for general use.

5000 µS/cm solution s ideal for those applications that need to achieve higher reading accuracies in a conductivity scale between 2000 µS/cm and 10000 µS/cm.

12880 µS/cm (12.88 mS/cm) solution is widely used to assure proper performance of conductivity meters with a scale higher than 10 mS/cm.

8000 µS/cm solution is needed for the proper calibration of instrumentation used to measure high conductivity samples.

111800 µS/cm solution is useful to calibrate instrumentation used to measure samples with conductivity higher than 100 mS/cm (100,000 µS/cm).

BOTTLES AND SACHETS

CODE	EC VALUE @25°C	SIZE	PACKAGE
HI 7033L	84 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7033M	84 µS/cm (µmho/cm)	250 mL	1 bottle
HI 70033P	84 µS/cm (µmho/cm)	20 mL	25 sachets
HI 7031/1G	1413 µS/cm (µmho/cm)	1 Gallon (3.78 L)	1 bottle
HI 7031L	1413 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7031M	1413 µS/cm (µmho/cm)	250 mL	1 bottle
HI 70031P	1413 µS/cm (µmho/cm)	20 mL	25 sachets
HI 7039L	5000 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7039M	5000 µS/cm (µmho/cm)	250 mL	1 bottle
HI 70039P	5000 µS/cm (µmho/cm)	20 mL	25 sachets
HI 7030/1G	12880 µS/cm (µmho/cm)	1 Gallon (3.78 L)	1 bottle
HI 7030L	12880 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7030M	12880 µS/cm (µmho/cm)	250 mL	1 bottle
HI 70030P	12880 µS/cm (µmho/cm)	20 mL	25 sachets
HI 7034L	80000 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7034M	80000 µS/cm (µmho/cm)	250 mL	1 bottle
HI 7035L	111800 µS/cm (µmho/cm)	500 mL	1 bottle
HI 7035M	111800 µS/cm (µmho/cm)	250 mL	1 bottle

TDS Solutions

HANNA is one of the few producers to offer TDS calibration solutions for agriculture applications with packages from 20 to 500 mL.

BOTTLES AND SACHETS

CODE	TDS VALUE @25°C	SIZE	PACKAGE
HI 7032L	1382 ppm (mg/L)	500 mL	1 bottle
HI 7032M	1382 ppm (mg/L)	250 mL	1 bottle
HI 70032P	1382 ppm (mg/L)	20 mL	25 sachets
HI 7036L	12.41 ppt (g/L)	500 mL	1 bottle
HI 7036M	12.41 ppt (g/L)	250 mL	1 bottle
HI 70038P	6.44 ppt (g/L)	20 mL	25 sachets
HI 70080P	800 ppm (mg/L)	20 mL	25 sachets
HI 70442L*	1500 ppm (mg/L)	500 mL	1 bottle
HI 70442M*	1500 ppm (mg/L)	250 mL	1 bottle
HI 70442P*	1500 ppm (mg/L)	20 mL	25 sachets

*TDS conversion factor 4-4-2: 0.65 ppm = 1 µS/cm (approximately)

Fig. 1

Fig. 3

Fig. 2

2:1 SOIL TESTING

Methods

Slurry: Mixing distilled water with soil media. Several dilution formulas 1:1, 2:1, 3:1

The most common slurry is 2:1

Pour thru: Pouring water through the media and measuring the leachate.

Advantages of Each Method

Slurry: Most cultural guide recommendations are based on this method.

Pour thru: good for testing small cells (plug trays) and large nursery pots.

Different methods give different readings.

How to Perform a 2:1 Slurry

Formula: 2 parts distilled water, 1 part media.

Mix the water and media together then wait for 15 minutes to allow for minerals to dissolve in the water.

Place meter in slurry and measure.

HOW TO CALIBRATE HI 98129 AND HI 98130 COMBO TESTERS

First Step For New Meters

For new meters soak in tap water for 30 minutes to re-hydrate pH bulb and to clean off any deposits (Fig. 1).

Turning On

Push left MODE button and release.

The display will scroll through battery and display function: pH,mS or ppt

pH Function

Press the HOLD button to move to different functions.

Leave meter in pH function.

Entering Calibration Mode

Press and hold the left MODE button. The display will cycle through the OFF screen then display CAL. Release the button when CAL appears on the display (Fig. 2).

The display will next read 7.01 USE. This means place the tester in pH 7.01 solution (Fig. 3).

When the display reads 4.01 USE, remove the tester from the pH 7.01 solution and place the tester in pH 4.01 solution.

Calibration Complete

The tester will display Okay momentarily then read 4.0, or 3.9.

The tester is now calibrated

MEASURING SAMPLES WITH THE CHECKER®HC

"Zero" the Checker®HC with your unreacted water sample

Add reagent to your water sample

Place the vial into your Checker®HC

Press the button and read the results. it's that easy!

Limited Warranty, Return and Exchange

Limited Warranty

HANNA products are manufactured in our ISO 9001:2000 facilities, meeting the highest quality standards in the industry. HANNA's high standards also apply should a product be returned due to defects in material or workmanship. Our extensive warranty extends up to five years on some products.

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.

The warranty period commences from the original date of sale to the user or a maximum of 18 months from factory ship date. Warranty is valid only when the product is used under normal conditions and in accordance with operating limitations and prescribed maintenance procedures. The express warranty stated previously is the only express warranty given by HANNA to the end-user buyer. HANNA expressly disclaims any warranties implied by law, including but not limited to warranty of merchantability of fitness for a particular purpose. HANNA shall not be liable for any individual or consequential damages of any kind for breach of any warranty, negligence, on the basis of strict liability or otherwise. HANNA's warranty periods differ across our range of instrumentation, please visit us on the web at: www.hannainst.com or contact your local HANNA representative for specific warranty information.

Instrument Service:

Warranty and non-warranty service, replacement, recalibration and repairs are performed by factory trained service technicians at one of HANNA's Technical Service Centers worldwide. All items must have a Return Goods Authorization (RGA) number that can be obtained by contacting the HANNA Technical Service Department. The RGA number should be clearly marked on the outside of the box and the unit shipped prepaid and insured. Any product not bearing an RGA number will be refused. All products returned for warranty repair or replacement MUST be preceded or accompanied with proof of purchase, such as the original invoice or packing slip. Under special circumstances it may be deemed necessary by HANNA to issue a Return In Advance (RIA). In such cases, the defective materials must be returned to HANNA within 30 days. Materials not returned within 30 days become chargeable. Materials must be packed properly to avoid damage during transport, which would render the warranty null and void. The sender is responsible for expediting any damage claims placed against the carrier.

In most cases, a flat minimum service charge applies to non-warranty repairs or recalibration. Please contact your local HANNA Technical Service Department for current rates. Any materials returned for repair which are considered non-warranty may be serviced at hourly cost (excluding parts) following subsequent notification and approval of such.

Product Return and Exchange

Returning Merchandise:

Should an instance occur when a product may need to be returned for exchange or credit, or should a discrepancy occur in a packing slip, HANNA must be contacted to obtain a Return Goods Authorization Number (RGA). Please follow these steps:

1. Within 30 days of receipt of merchandise call HANNA's Technical Service Department to obtain a Return Goods Authorization Number.
2. HANNA will issue a Return Goods Authorization Number.
3. The number must be clearly marked on the outside of the package being returned. Shipments not bearing a Return Goods Authorization Number will be refused.
4. Credit returns may be subject to a 25% restocking fee.

Terms and Conditions

Return shipments must meet the following requirements to be accepted for credit:

1. Products must be returned in the original packaging with labeling not defaced. All items returned will be inspected for credit worthiness. Credit will only be issued for product returned in like-new condition. No credit will be issued for product, which is not received in like-new condition.
2. All freight charges are the responsibility of the customer.
3. All chemicals and reagents being returned must be packaged in accordance with the laws and regulations of the governing country. Only unopened chemicals and reagents may be returned.

Visit us on the web for additional product information, contacts and distributor information

WWW.HANNAINST.COM

ISO 9001:2000 CERTIFIED

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