**Analytical
Testing for the
Food Industry**

Test crucial parameters
in the food industry

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HANNA®
instruments

Analytical Testing for the Food Industry

Contents

HANNA® instruments

iris Spectrophotometer

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

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

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Step-by-step method creation

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

Favorite methods feature

Always have your most frequently used methods readily available.

Pre-programmed methods

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

User methods

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

Data logging and transfer

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

Spectral range

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

Battery operated

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

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iris is pre-programmed with 85 different tests.

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

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pH/EC/TDS Combo Tester

- Waterproof and designed to float
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature.
  - Temperature displayed in °C or °F along with pH reading.
- Replaceable pH electrode cartridge
  - The Combo features an easy-to-replace pH electrode. The sturdy, snap-in connector means there are no pins to bend or break.
- Extendable cloth junction
  - Simply pull out 3 mm (1/8") and cut when the cloth junction becomes dirty to improve response time and stability.
- Measurement stability indicator
- HOLD button to freeze readings on the display
- BEPS (Battery Error Prevention System)
  - Meter will automatically shuts off if there is not enough power to get an accurate measurement.
- Battery % level at startup
- Low Battery Indicator
- Auto-off

Specifications		HI98129	HI98130
pH	Range	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.05 pH	±0.05 pH
	pH Calibration	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)	
Conductivity	Range	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy	±2% FS	±2% FS
	EC/TDS Calibration	automatic, one-point at 1413 µS/cm or 1382 ppm (mg/L)	automatic, one-point at 12.88 mS/cm or 6.44 ppt (g/L)
TDS	Range	0 to 2000 mg/L (ppm)	0.00 to 10.00 g/L (ppt)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% FS	±2% FS
Temperature	Range	0.0 to 60.0°C / 32.0 to 140.0°F	0.0 to 60.0°C / 32.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C /±1°F	±0.5°C /±1°F
Ordering Information	**HI98129** (Combo) and **HI98130** (Combo) are supplied with HI73127 pH electrode and HI73128 electrode removal tool, batteries and instructions.		

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ORP and pH/ORP Testers

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

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

When the cloth junction of the HI98121's pH electrode becomes clogged and response time is sluggish, simply pull out 3 mm (1/8") to clear the clogging which will improve response time and stability.

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

Specifications		HI98120	HI98121
pH	Range	–	-2.00 to 16.00 pH
	Resolution	–	0.01 pH
	Accuracy	–	±0.05 pH
	Calibration	–,	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)
ORP	Range	± 1000 mV	± 1000 mV
	Resolution	1 mV	1 mV
	Accuracy	±2 mV	±2 mV
	Calibration	factory-calibrated	factory-calibrated
Temperature	Range	-5.0 to 60.0°C / 23.0 to 140.0°F	-5.0 to 60.0°C / 23.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Additional Specifications	Electrodes	HI73120 replaceable ORP electrode (included)	HI73127 replaceable pH electrode (included); fixed ORP sensor
Ordering Information	**HI98120** (ORP) is supplied with HI73120 ORP electrode, HI73128 electrode removal tool, batteries and instructions. **HI98121** (ORP/pH) is supplied with HI73127 pH electrode, HI73128 electrode removal tool, batteries and instructions.		

HANNA® instruments

pH and Temperature Testers

The pHep®4 and pHep®5 are waterproof pH testers that have many advanced features found in more expensive portable instrumentation.

- Waterproof and designed to float
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature.
  - Temperature displayed in °C or °F along with pH reading.
- Replaceable pH electrode cartridge
  - The easy-to-replace pH electrode with a sturdy, snap-in connector means there are no pins to bend or break.
- Extendable cloth junction
  - Simply pull out 3 mm (1/8") and cut when the cloth junction becomes dirty to improve response time and stability.
- Measurement stability indicator
- HOLD button to freeze readings on the display
- BEPS (Battery Error Prevention System)
  - Meter will automatically shuts off if there is not enough power to get an accurate measurement.
- Battery % level at startup
- Low Battery Indicator
- Automatic Shut-Off

Specifications		HI98127 (pHep®4)	HI98128 (pHep®5)
pH	Range	-2.0 to 16.0 pH	-2.00 to 16.00 pH
	Resolution	0.1 pH	0.01 pH
	Accuracy	±0.1 pH	±0.05 pH
	pH Calibration	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or pH 4.01 / 6.86 / 9.18)	
Temperature	Range	-5.0 to 60.0°C / 23.0 to 140.0°F	-5.0 to 60.0°C / 23.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C /±1°F	±0.5°C /±1°F
Ordering Information	**HI98127** (pHep®4) and **HI98128** (pHep®5) are supplied with HI73127 pH electrode, HI73128 electrode removal tool, batteries and instructions.		

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pHep+ Waterproof Pocket pH Tester

with 0.01 pH Resolution

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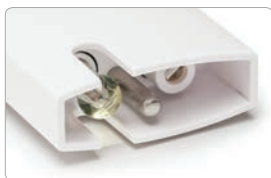
Exposed temperature sensor

An exposed temperature sensor facilitates faster response times.

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

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Foodcare

Sushi pH Tester

with specialized probe

The HI981035 Foodcare Sushi pH tester is designed for the measurement of pH of sushi rice as part of a Hazardous Analysis of Critical Control Points (HACCP) plan.

- pH electrode with open junction
  - The pH electrode of this tester uses an open outer junction design. The open junction is clogging resistant due to the hard gel surface known as Viscolene that is used for the reference cell. When the junction becomes coated with starch from the rice simply clean the probe to expose the viscolene reference.
  - Easy to clean electrode with a maintenance-free gel electrolyte
- Glass body
  - The glass body of the pH electrode is not porous and has no traps for food particles. The glass can be easily cleaned and reduce the risk of bacterial contaminants.
- One or two-point automatic calibration
  - The calibration buffers are automatically recognized and after calibration the buffer values used are shown on the display.
- Stability indicator
  - An hourglass indicator is displayed on the LCD until a stable reading is obtained.
- Automatic shut-off
- Long battery life with low battery indicator

Flat tip electrode

A flat tip pH electrode allows for the direct measurement of solids by simply touching the surface of the product. No slurries to make with purified water.

Specifications		HI981035
pH	Range	0.0 to 14.0 pH
	Resolution	0.1 pH
	Accuracy (@25°C/77°F)	±0.2 pH
	Calibration	automatic, one or two-point
Ordering Information	**HI981035** is supplied with pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), electrode cleaning solution sachet (2), CR2032 3V Li-ion battery, quality certificate, and instruction manual.	

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Foodcare

Meat pH Tester

with specialized probe

The HI981036 Foodcare Meat pH tester is designed for the measurement of pH during the meat processing process.

- pH electrode with replaceable bridge electrolyte
  - The pH electrode has an outer junction sleeve that can be removed and cleaned. Once cleaned a small amount of supplied gel electrolyte is added and the junction is refreshed improving the pH measurement and extending the life of the meter.
- Low temperature (LT) glass
  - Low temperature is beneficial when measuring food products at lower temperatures in order to have the ideal resistance for the measuring circuit.
- PVDF body
  - Polyvinylidene Fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength, and resistance to ultraviolet. PVDF is also resistant to fungal growth.
- One or two-point automatic calibration
  - The calibration buffers are automatically recognized and after calibration the buffer values used are shown on the display.
- Stability indicator
  - An hourglass indicator is displayed on the LCD until a stable reading is obtained.
- Automatic shut-off
- Long battery life with low battery indicator

Food grade PVDF body

Removable sleeve to extend probe life

Conical tip

Allows for easy penetration into solids and semisolids, which is needed when wanting to take a direct measurement in meat.

Specifications		HI981036
pH	Range	0.0 to 14.0 pH
	Resolution	0.1 pH
	Accuracy (@25°C/77°F)	±0.2 pH
	Calibration	automatic, one or two-point
Ordering Information	**HI981036** is supplied with AISI 316 stainless steel sheath, pH 4.01 buffer solution sachets (2), pH 7.01 buffer solution sachets (2), electrode cleaning solution sachets (2), CR2032 3V Li-ion battery, quality certificate, and instruction manual.	

Milk pH Tester

with specialized probe

The HI981034 Foodcare Milk pH tester is designed for the measurement of pH in the milk production process. This meter offers many advanced features including resistance to clogging of the reference junction, which results in a longer life than standard pH testers.

- **pH electrode with open junction**
  - The pH electrode of this tester uses an open outer junction design. The open junction is more resistant to clogging when the probe is inserted into solids and semisolids than pH electrodes that use ceramic or other porous materials that can clog.

- **Low temperature (LT) glass**
  - Low temperature is beneficial when measuring food products at lower temperatures in order to have the ideal resistance for the measuring circuit.

- **One or two-point automatic calibration**
  - The calibration buffers are automatically recognized and after calibration the buffer values used are shown on the display.

- **Stability indicator**
  - An hourglass indicator is displayed on the LCD until a stable reading is obtained.

- **Automatic shut-off**

- **Long battery life with low battery indicator**

Conical tip electrode

Allows for a large surface area and easy penetration into semisolids making it ideal for milk and milk products such as yogurt.

Specifications		HI981034
pH	Range	0.0 to 14.0 pH
	Resolution	0.1 pH
	Accuracy (@25°C/77°F)	±0.2 pH
	Calibration	automatic, one or two-point
Ordering Information	**HI981034** is supplied with pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), electrode cleaning solution sachet (2), CR2032 3V Li-ion battery, quality certificate, and instruction manual.	

Foodcare

Cheese pH Tester

with specialized probe

The HI981032 Foodcare Cheese pH tester is designed for the measurement of pH during the cheesemaking process.

- **pH electrode with open junction**
  - The pH electrode of this tester uses an open outer junction design. The open junction is more resistant to clogging when the probe is inserted into solids and semisolids than pH electrodes that use ceramic or other porous materials that can clog.
  - Easy to clean electrode with a maintenance-free gel electrolyte
- **Low temperature (LT) glass**
  - Low temperature is beneficial when measuring food products at lower temperatures in order to have the ideal resistance for the measuring circuit.
- **PVDF body**
  - Polyvinylidene Fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength, and resistance to ultraviolet. PVDF is also resistant to fungal growth
- **One or two-point automatic calibration**
  - The calibration buffers are automatically recognized and after calibration the buffer values used are shown on the display.
- **Stability indicator**
  - An hourglass indicator is displayed on the LCD until a stable reading is obtained.
- **Automatic shut-off**
- **Long battery life with low battery indicator**

Food grade PVDF body

Conical tip electrode

Allows for easy penetration into solids and semisolids, which is needed when wanting to take a direct measurement in cheese.

Specifications		HI981032
pH	Range	0.0 to 14.0 pH
	Resolution	0.1 pH
	Accuracy (@25°C/77°F)	±0.2 pH
	Calibration	automatic, one or two-point
Ordering Information	**HI981032** is supplied with pH 4.01 buffer solution sachets (2), pH 7.01 buffer solution sachets (2), electrode cleaning solution sachets (2), CR2032 3V Li-ion battery, quality certificate, and instruction manual.	

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EC/TDS and Temperature Testers

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

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

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

- Waterproof
- Replaceable graphite electrode
  - An easy-to-replace graphite electrode with a sturdy, snap-in connector means there are no pins to bend or break.
- Automatic temperature compensation (ATC)
- HOLD button to freeze readings on the display
- BEPS
  - Alerts the user of low battery power that could adversely affect readings.

Specifications		HI98311 (DiST®5)	HI98312 (DiST®6)
EC	Range	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy	±2% FS	±2% FS
	Calibration	automatic, one-point at 1413 µS/cm or 1382 ppm (mg/L)	automatic, one-point at 12.88 mS/cm or 6.44 ppt (g/L)
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% FS	±2% FS
	TDS Conversion Factor	adjustable from 0.45 to 1.00	
Temperature	Range	0.0 to 60.0°C / 32.0 to 140.0°F	0.0 to 60.0°C / 32.0 to 140.0°F
	Resolution	0.1°C / 0.1°F	0.1°C / 0.1°F
	Accuracy	±0.5°C / ±1°F	±0.5°C / ±1°F
Ordering Information		**HI98311** (DiST®5) and **HI98312** (DiST®6) are supplied with HI73311 EC/TDS probe, HI73128 probe removal tool, batteries and instructions.	

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EC and TDS Testers

These testers feature an amperometric graphite electrode that provides improved repeatability in measurements, since they do not oxidize. An amperometric measurement of EC/TDS is based on Ohm's Law, $I = V/R$, where R depends on the distance between two pins and their surface. Oxidation changes both the distance and surface, which will directly affect accuracy. DiST non-oxidizing graphite pins are able to provide an optimal surface for accurate, dependable results.

When calibration is needed, simply submerge the electrode tip into calibration solution and the meter will auto calibrate.

- Waterproof
- Automatic temperature compensation (ATC)
- Automatic one-point calibration
- Measurement stability indicator
- Temperature measurement

Specifications		HI98301 (DiST®1) TDS	HI98302 (DiST®2) TDS	HI98303 (DiST®3) EC	HI98304 (DiST®4) EC
EC and TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)	0 to 2000 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)	1 µS/cm	0.01 mS/cm
	Accuracy (@25°C/77°F)	±2% FS		±2% FS	
	TDS Factor	0.5	0.5	–	–
	Calibration	automatic, one-point			
Temperature	Range	0.0 to 50.0°C/32.0 to 122.0°F			
	Resolution	0.1°C / 0.1°F			
	Accuracy (@25°C/77°F)	±0.5°C / ±1.0°F			
Additional Specifications	Calibration Solution	HI70032: 1382 ppm	HI70038: 6.44 ppt	HI70031: 1413 mS/cm	HI70030: 12.88 mS/cm
Ordering Information	**HI98301** (DiST 1) is supplied with CR2032 3V Li-ion battery, 1382 ppm calibration solution sachet (4), storage/protection sleeve, instruction manual and quality certificate. **HI98302** (DiST 2) is supplied with CR2032 3V Li-ion battery, 6.44 ppt calibration solution sachet (4), storage/protection sleeve, instruction manual and quality certificate. **HI98303** (DiST 3) is supplied with CR2032 3V Li-ion battery, 1413 µS/cm calibration solution sachet (4), storage/protection sleeve, instruction manual and quality certificate. **HI98304** (DiST 4) is supplied with CR2032 3V Li-ion battery, 12.88 mS/cm calibration solution sachet (4), storage/protection sleeve, instruction manual and quality certificate.				

Water Quality in Coffee Brewing

Coffee is one the favorite beverages consumed by billions of people worldwide. Coffee, no matter the brand and quality, can be affected drastically during the brewing stage. The water quality plays a vital role in determining the taste of the beverage. An equally important physical factor is the temperature of the water. Brewing is a chemical reaction between hot water and coffee. Overall, the brewing process extracts compounds from the coffee grounds; how these compounds are extracted is temperature-dependent. Slight variations in temperature affect the taste and aroma of the coffee. Colder water will result in less extraction, leaving the coffee tasting sour, weak and diluted, whereas, water that is too hot will cause over extraction, resulting in bitter and burnt tasting coffee.

HANNA Instruments

Checktemp® Dip Digital Thermometer

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

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

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

HANNA® instruments

Checktemp® Digital Thermometer

- CAL Check™ calibration verification at startup
- IP 65 water resistant protection
- AISI 316 stainless steel penetration Probe

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

Checktemp®1 Digital Thermometer

with Stainless Steel Probe and 3.3' Silicone Cable

- CAL Check™ calibration verification at startup
- IP65 water resistant protection
- AISI 316 stainless steel penetration probe
- 3.3' silicone probe cable

| Specifications	
Range	-50.0 to 150.0°C; -58.0 to 302°F
Resolution	0.1°C (-50.0 to 150°C); 0.1°F (-58.0 to 199.9°F), 1°F (above 200°F)
Accuracy	±0.2°C (-30 to 120.0°C); ±0.3°C (outside: -50.0 to -30.0°C and 120.0 to 150.0°C); ±0.5°F (-22.0 to 199.9°F); ±1°F (outside: -58.0 to -22.0°F and 200 to 302°F)
Probe	stainless steel probe with 1 m (3.3') silicone cable; 97.3 x dia 3.5 mm (3.8 x dia 0.14")
Ordering Information	**HI98509** (Checktemp 1) is supplied with penetration probe, batteries, stand and instructions.

T-Shaped Thermometer

HI145 thermometers were developed for HACCP programs that require high standards of performance with simplicity of use.

- CAL Check™ calibration status alert
- HOLD button to freeze readings on the display

Specifications	HI145-00	HI145-01
Range	-50.0 to 220°C	-58.0 to 428.0°F
Resolution	0.1°C (-50.0 to 199.9°C); 1°C (200 to 220°C)	0.1°F (-58.0 to 199.9°F); 1°F (200 to 428°F)
Accuracy	±0.3°C (-20 to 90°C); ±0.4% FS (outside)	±0.6°F (-4 to 194°F); ±0.4% FS (outside)
Probe	AISI 316 stainless steel probe; 125 mm x dia 5 mm (4.9 x dia 0.2")	
Ordering Information	**HI145-00** and **HI145-01** are supplied complete with battery and instructions.	

Checkfridge Remote Sensor Thermometer

Hanna provides users a convenient means to monitor internal temperature conditions of a refrigerator or freezer from the outside. The Hanna HI147 Checkfridge is the ideal thermometer for accurate, reliable internal temperature readings.
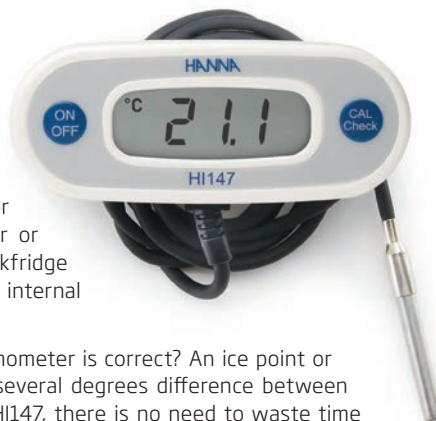
How do you know when the reading on the thermometer is correct? An ice point or slurry could be made. Even then there could be several degrees difference between the real and theoretical temperatures. With the HI147, there is no need to waste time preparing an ice bath for making these tests; its unique CAL Check feature can simulate it. Conveniently located on the face of the thermometer is a TEST switch. Engage the switch and the HI147 performs an internal CAL Check. In only a few seconds, you see the results on the large LCD. Return the switch to the READ position and the HI147 returns to its normal measuring status.

- CAL Check™ alerts users of calibration status
- BEPS alerts the user of low battery power that could adversely affect readings

Specifications	HI147-00 Checkfridge C	HI147-01 Checkfridge F
Range	-50.0 to 150.0°C	-58.0 to 302.0°F
Resolution	0.1°C	0.1°F (-58.0 to 199.9°F) 1°F (200 to 302°F)
Accuracy	±0.3 °C ±1 digit (-20.0 to 90.0 °C); ±0.5% FS ±1digit (outside)	±0.5 °F ±1 digit (-4.0 to 194.0 °F); ±1% FS ±1 digit (outside)
Ordering Information	**HI147-00** (Checkfridge C) is supplied with battery and instructions. **HI147-01** (Checkfridge F) is supplied with battery and instructions.	

HANNA® instruments

T-Logger

with Locking Wall Cradle

The monitoring of temperature is critical through all stages in food distribution. This includes from the time it is packaged and stored to transportation to the local market or restaurant. For cold food storage it is necessary to ensure that the product is always stored properly to maintain quality and for safety to prevent bacteria growth. The HI144-10 will help to be compliant in recording temperatures as part of a HACCP monitoring program.

Using the supplied PC software HI144-10 can be programmed to record the temperature in intervals from 1 minute to 24-hours and can store up to 8,000 readings.

The HI144-10 is supplied with the HI144 T-Logger, USB cradle, wall mount with lock and software. Additional HI144 T-loggers can be ordered without the cradle and software. Each T-logger has its' own unique serial number.

- Compact waterproof data logger
  - LCD displays temperature, high and low alarms, logging status and battery indicator
  - Wall mount with lock
  - Stores up to 8,000 measurements
  - 2-year battery life

- Programming features (using PC software and HI144002 USB docking cradle):
  - Choice of start: From the PC, a specific date/time, or push button on T-Logger
  - Choice of measurement units: °C or °F
  - High and low alarm setpoints with indicators on LCD
  - Selectable logging interval in minutes and hours
  - Choice of data management: Store until full, fixed number or wrap around
  - Data export as an .xls file

HI144002 USB docking cradle included with HI144-10

wall cradle

Specifications	HI144
Range	-30.0 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)
Calibration	factory-calibrated
Ordering Information	**HI144-10** is supplied with HI144 T-Logger, HI144002 USB communication cradle, USB flash drive with HI92144 Windows® compatible software, CR2032 lithium ion battery, wall cradle, lock, and instruction manual. **HI144** is supplied with HI144 T-Logger, CR2032 lithium ion battery, wall cradle, lock, and instruction manual.

Checktemp®4
Temperature Tester
with folding probe

HI151 Checktemp 4 is the perfect portable, high-accuracy thermometer for home and professional kitchens. The sharp, stainless steel, fold-out probe is ideal when testing fresh, cooked and semi-frozen food. The sensing tip allows the user to accurate measure the temperature of thin food or the thickest part of the sample. HI151 Checktemp 4 measures temperature in both °C and in °F.

The thermometer has a waterproof and compact casing and is factory-calibrated. The calibration is verified every time the thermometer is turned ON. The thermometer features a motion sensor which eliminates the need of closing and reopening the probe when the meter goes idle.

Six color-coded thermometers are available to meet the food hygiene and Hazard Analysis Critical Control Point (HACCP) regulations.

- Ergonomic shape
- Measures in both °C and °F
- Case features IP67 protection and floats
- Turns on by motion sensor
- Internal calibration verification

HI151
white, for dairy products

HI151-1
red, for raw meat

HI151-3
yellow, for cooked meat

HI151-2
blue, for raw fish

HI151-4
green, for salad and fruits

HI151-5
brown, for vegetables

Specifications		HI151
Temperature	Range	-50.0 to 300 °C / -58.0 to 572.0 °F
	Resolution	0.1 °C (-50.0 to 199.9 °C); 1.0 °C (200.0 to 300.0 °C) 0.1 °F (-58.0 to 199.9 °F); 1.0 °F (200.0 to 572.0 °F)
	Accuracy (@25°C/77°F)	± 0.4 °C (-50.0 to -30.0 °C); ± 0.2 °C (-30.0 to 170.0 °C) ± 0.4 °C (170.0 to 199.9 °C); ± 1.0 °C ± 1 digit (200.0 to 300.0 °C) ±0.8 °F (-58.0 to -22.0 °F); ±0.4 °F (-22.0 to 199.9 °F) ±1.0 °F (200.0 to 392.0 °F); ±2.0 °F ± 1 digit (392.0 to 572.0 °F)
	Calibration	factory-calibrated
Ordering Information		**HI151** (white/dairy products) is supplied with batteries, quality certificate, and instruction manual. **HI151-1** (red/raw meat) is supplied with batteries, quality certificate, and instruction manual. **HI151-2** (blue/raw fish) is supplied with batteries, quality certificate, and instruction manual. **HI151-3** (yellow/cooked meat) is supplied with batteries, quality certificate, and instruction manual. **HI151-4** (green/salad and fruits) is supplied with batteries, quality certificate, and instruction manual. **HI151-5** (brown/vegetables) is supplied with batteries, quality certificate, and instruction manual.

HANNA®
instruments

HANNA instruments

HALO 2

Wireless pH Testers

A pH tester for every application.

15 Application Specific Models

Foodcare
Milk pH Tester

GroLine
Soil pH Tester

Foodcare
Sushi pH Tester

IP65 waterproof

Bluetooth®

Hanna Lab App Compatible

pH | HALO

Hanna Lab App

Available on iOS and Android

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

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

Views
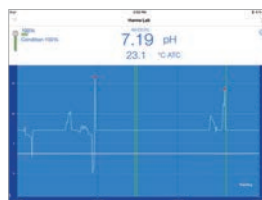
- **Just the essentials**
  - Basic view provides measurement information in a clean, straightforward manner.
- **All information on display**
  - Table view is able to display measurement, time and date, annotations, and alarm status in a continuously updated table.
- **Fluid, dynamic graphing**
  - Graph view provides measurement information linearly. Graph axes may be expanded using pinch-to-zoom technology for enhanced viewing.

Hanna Lab App Specifications*

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

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

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HANNA® instruments

25

HALO2 - Wireless pH Meter

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

Bottom line

HALO2 is a pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device used as a pH meter. This BT smart technology is energy efficient, allowing for low power consumption to maximize the life of the replaceable battery used in the pH electrode. HALO2 pH probes can be used virtually anywhere: in the field, laboratory, or classroom. With 15 styles of pH electrodes to choose from, matching a HALO2 to your need is easy for a customized testing experience.

Benefits

Turn your smart device into a full-featured pH meter.

Connect to the Hanna Lab App at the press of a button via Bluetooth® wireless technology (10 m range (33')). Hanna Lab App features data, app information, general HALO information, pH tutorials, and contact information.

Sort and share your data.

pH and temperature measurements are updated every second and automatically saved every hour. Measurements can be displayed alone on the display, with tabulated data, or as a graph. Push button on demand highlights your data of interest and data points can be annotated with measurement specific information. Share your data via email in PDF or CSV.

Increase traceability.

Ensure that your data can be trusted with Good Laboratory Practice (GLP) information including probe offset and average slope of the last calibration. The Hanna Lab App can also be used to set alarm thresholds and calibration reminders.

Simple, one button operation

On/off, easy calibration and auto-off

When used with HALO2, the Hanna Lab App turns a compatible smart device into a full-featured pH meter. Functions include calibration, measurement, graphing, datalogging, and data sharing as well as Good Laboratory Practice (GLP) capabilities.Measurement and logging start at one second intervals as soon as HALO2 is connected.

Analytical Testing for the Food Industry

Foodcare

HI9810352

HALO2
for Sushi

Accurate and easy to use, HALO2 Wireless pH Tester for Sushi is designed to measure the pH of sushi rice and ensure it meets the food-hygiene and Hazard Analysis Critical Control Point (HACCP) regulations.

- 0.00 to 12.00 pH range
- Titanium body
  - The rugged titanium electrode body works as an electronic shield protecting against interferences from electrical noise or humidity.
- Flat tip, clog resistant electrode
  - The flat tip provides optimal surface contact for sushi rice pH measurements. When the junction becomes coated with starch from rice, simply clean the probe to expose the hard gel (viscolene) reference.

HI9810342

HALO2
for Milk

Accurate and easy to use, the HALO2 Wireless pH Tester for Milk is designed to measure the pH during the milk production process.

- 0.00 to 12.00 pH range
- Glass body electrode
  - features a non-porous glass body that is easy to clean and disinfect.
- Maintenance free
  - Gel-filled reference with no fill solutions required. Other than routine calibration and cleaning, this probe is maintenance free.
- Conical tip electrode
  - Allows for easy penetration into semisolids, ideal for milk and milk products like yogurt.

HI9810322

HALO2
for Cheese

Accurate and easy to use, HALO2 Wireless pH Tester for Cheese is designed to measure and monitor pH during the main processing steps of cheese manufacturing and ensure it meets the food-hygiene and Hazard Analysis Critical Control Point (HACCP) regulations.

- 0.00 to 12.00 pH range
- Food grade PVDF electrode body
  - Easy to clean and disinfect.
- Conical tip electrode
  - Allows for easy penetration into solids and semisolids such as cheese.

HI9810362

HALO2
for Meat

Accurate and easy to use, HALO2 Wireless pH Tester for Meat is ideal for pH measurement during meat processing.

- 0.00 to 12.00 pH range
- Food grade PVDF electrode body
  - Easy to clean and disinfect
- Easy pH electrode cleaning
  - A removable sleeve allows for cleaning, disinfecting, and refreshing (with supplied gel electrolyte) of the outer reference area.
- Conical tip electrode
  - Allows for easy penetration into solids and semisolids such as meats and sausages.

HI9810392

HALO2
for Chocolate

Accurate and easy to use, HALO2 Wireless pH Tester for Chocolate is ideal for pH measurement during the chocolate making process.

- 0.00 to 12.00 pH range
- Food grade PVDF electrode body
  - Easy to clean and disinfect
- Easy pH electrode cleaning
  - A removable sleeve allows for cleaning, disinfecting, and refreshing (with supplied gel electrolyte) of the outer reference area.
- Conical tip electrode
  - Allows for easy penetration into soft solids and semisolids such as chocolate.

HI9810382

HALO2
for Bread & Dough

Accurate and easy to use, HALO2 Wireless pH Tester for Bread & Dough is ideal to measure the pH during baking processes and ensure it meets the food-hygiene and Hazard Analysis Critical Control Point (HACCP) regulations.

- 0.00 to 12.00 pH range
- Food grade PVDF electrode body
  - Easy to clean and disinfect.
- Conical tip electrode
  - Allows for easy penetration into solids and semisolids such as bread and dough.

HANNA® instruments

edge® Multiparameter pH Meter

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

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

Portable field unit

Wall–mount cradle

Electrode holder with built-in cradle

HANNA® instruments

Analytical Testing for the Food Industry

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

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

d DIGITAL	HI2020 includes 11310 pH electrode. All edge compatible pH, EC and dissolved oxygen digital probes are interchangeable with edge.

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

Specifications		HI2020
pH*	Range	-2.00 to 16.00 pH; -2.000 to 16.000 pH†
	Resolution	0.01 pH; 0.001 pH†
	Accuracy (@25°C/77°F)	±0.01 pH; ±0.002 pH†
	Calibration	automatic, up to five points (Standard mode) 1.68, 4.01 (3.00†), 6.86, 7.01, 9.18, 10.01, 12.45, and two custom buffers; up to three points (Basic mode) 4.01; 6.86; 7.01; 9.18; 10.01
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
Temperature*	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Ordering Information		**HI2020-01** (115V) and **HI2020-02** (230V) pH kit includes: HI11310 glass body, refillable pH electrode with temperature sensor, pH 4 buffer solution sachets (4), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2), and electrode cleaning solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.

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

HANNA® instruments

Laboratory Research Grade Two-Channel Benchtop pH/mV Meters

with or without ISE measurement

The HI5222 and HI5221 are advanced research grade two-channel benchtop meters that are completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. HI5222 measures pH/ISE/mV while HI5221 measures pH/mV. These meters are rich in features including five-point calibration, selectable resolution, data logging, alarm limits, comprehensive GLP, automatic temperature compensation, and much more. These meters also feature dedicated keys for routine operation and virtual keys for setup options.

- Highly customizable user interface
  - Can display measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data.
- Capacitive touch
  - Sensitive capacitive touch buttons ensures the buttons cannot be clogged with sample residue.

- Color graphic LCD
  - The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.
- Two galvanically channels
  - Each input channel has connectors for BNC probes, reference probes and a temperature sensor.

HANNA® **instruments**

Analytical Testing for the Food Industry

- Choice of calibration
  - Automatic buffer recognition, semi-automatic, and direct manual entry pH calibration options are available.
- GLP data
  - View calibration data and calibration expiration information.
- CAL Check™
  - CAL Check™ alerts users to potential problems during the calibration of the pH electrode.
- ISE measurement with choice of concentration units (HI5222 only)
  - Allows for calibration and readings in choice of concentration units which include ppt, g/L, mg/mL, ppm, mg/L, µg/mL, ppb, µg/L, mg/mL, M, mol/L, mmol/L, %w/v and a user-defined unit.
- ISE measurement with incremental methods (HI5222 only)
  - The known addition, known subtraction, analyte addition, and analyte subtraction incremental methods are pre-programmed.
- Data logging
  - Automatic, manual, and AutoHold logging are available. Automatic and manual logs up to 100 lots with 50,000 records max/lot with up to 100,000 total data points per channel.

Specifications		HI5222 / HI5221
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five-point calibration, eight standard buffers available (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45), and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
ISE (HI5222 only)	Range	1×10^{-6} to 9.99×10^{10} concentration
	Resolution	1; 0.1; 0.01; 0.001 concentration
	Accuracy	±0.5% (monovalent ions); ±1% (divalent ions)
	Calibration	automatic, up to five-point calibration, seven fixed standard solutions available for each measurement unit, and five user defined standards
Temperature*	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C; ±0.4°F; ±0.2K
Ordering Information		**HI5222-01** (115V) and **HI5222-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.
		HI5221-01 (115V) and **HI5221-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

* limits will be reduced to actual sensor limits

HANNA®
instruments

edge®pH

Innovation dedicated to a single parameter

edge pH's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. edge pH is a single meter that can measure pH and ORP and is incredibly easy to use.

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

Portable field unit

Wall–mount cradle

Electrode holder with built-in cradle

Analytical Testing for the Food Industry

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

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

d **DIGITAL** HI2002 includes 11310 pH electrode.

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

Specifications		HI2002
pH	Range*	-2.00 to 16.00 pH; -2.000 to 16.000 pH†
	Resolution	0.01 pH; 0.001 pH†
	Accuracy (@25°C/77°F)	±0.01 pH; ±0.002 pH†
	Calibration	automatic, up to three points (five points†) calibration, 5 standard (7 standard†) buffers available (1.68†, 4.01 or 3.00, 6.86, 7.01, 9.18, 10.01, 12.45†) and two custom buffers†
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Ordering Information		**HI2002-01** (115V) and **HI2002-02** (230V) pH kit includes: HI11310 glass body, refillable pH electrode with temperature sensor, pH 4 buffer solution sachets (4), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2), and electrode cleaning solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.

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

HANNA® instruments

pH / Temperature Meter for Food

The HI98161 is a rugged, waterproof, portable pH meter that measures pH and temperature using the specialized FC2023 Foodcare pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Ergonomic, rugged, waterproof (IP67) design
- Backlit, graphic LCD
- CAL Check™ to alert users to problems during calibration including dirty/ broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
- 200 hour battery life with battery level displayed on measurement screen
- Log-on-demand up to 200 samples (100 pH and 100 mV range)
- Auto hold to automatically hold the first stable reading on the display
- Calibration timeout to alert the user at a defined interval when the calibration has expired
- PC connectivity via a sealed opto-isolated micro USB and HI92000 software
- GLP to provide data from previous calibration to ensure Good Laboratory Practices are met
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, PC software and connection cable, instruction manual, quick start guide, and batteries in a rugged, custom carrying case.

HI98161 includes FC2023 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

FC2023 pH / temperature probe for food

Food products can provide a number of challenges for the person that needs to measure pH. Food products tend to be solid, semi-solid or as a slurry with a high content of solids. All three types of samples will coat the sensitive glass membrane surface and/or clog the reference junction. The FC2023 that is supplied with the HI98161 is designed specifically for measuring pH in food. From a conic tip shape for easy penetration, open junction that resist clogging, and a Polyvinylidene fluoride (PVDF) food grade plastic body that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth. The FC2023 is an ideal general-purpose pH electrode for food products that connects to the HI98161 with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

Conical Glass Tip

The conical shaped tip design allows for penetration into solids, semi-solids, and emulsions for the direct measurement of pH in food products including meat, cheese, yogurt, and milk.

PVDF body

Polyvinylidene fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth.

Specifications		HI98161
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
	Calibration	up to five-point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and five custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
	Relative mV Offset Range	±2000 mV
Temperature*	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding probe error)
Ordering Information	**HI98161** is supplied with FC2023 pH electrode, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), HI700641 electrode cleaning solution sachet for dairy deposits (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in a rugged carrying case with custom insert.	

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

General Purpose Portable pH Meter for Food

The HI99161 is a portable pH and temperature meter is designed specifically for food applications. Monitoring pH in the dairy process is critical to ensure the quality of product is upheld.

- Ergonomic, rugged, waterproof (IP67) design
- Quick Connect probe
- Multi-level LCD display with probe condition indicator
- Automatic Temperature Compensation (ATC)
- Automatic one or two-point pH calibration
- Calibration tags displayed on-screen
- Stability indicator for accurate data recording
- 1400 hour battery life
- Battery life indication and low battery detection
- Adjustable auto-off
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, instruction manual, and batteries in a rugged, custom carrying case.

HI99161 includes F2023 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

Analytical Testing for the Food Industry

FC2023 pH / temperature probe for food

This pH meter uses the FC2023 pH electrode. with an easy-to-clean, PVDF body and a conical tip, this electrode is ideal for measurements in semi-solids such as cheeses. A specialized junction prevents clogging in viscous liquids such as milk or condiments.

Open junction reference

The open junction design consists of a solid gel interface (viscolene) between the sample and internal Ag/AgCl reference. This interface not only prevents silver from entering the sample, but also makes it impermeable to clogging, resulting in a fast response and stable reading.

PVDF body

Polyvinylidene fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth.

Conic glass tip

The conical shaped tip design allows for penetration into solids, semi-solids, and emulsions for the direct measurement of pH in food products including meat, cheese, yogurt, and milk.

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact
    HI710028 Orange
    HI710029 Blue

Specifications		HI99161
pH*	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH; 0.01 pH
	Accuracy	±0.1 pH; ±0.02 pH
	Calibration	automatic, one or two-point calibration with two sets of standard buffers (standard pH 4.01, 7.01, 10.01 or NIST pH 4.01, 6.86, 9.18)
Temperature*	Range	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C (up to 60°C); ±1.0°C (outside) / ±1°F (up to 140°F); ±2.0°F (outside)
Ordering Information		**HI99161** is supplied with FC2023 pH and temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700642 electrode cleaning solution sachets (2), 1.5V AAA batteries (3), instructions and hard carrying case.

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

Monitoring pH in the Meat Industry

In the meat production industry, the monitoring of pH is considered to be of the utmost importance due to its effect on the meat's quality factors including water binding capacity and shelf life. Upon slaughter, biochemical processes begin to break down the meat. Glycolysis begins post-mortem, converting glycogen to lactic acid, reducing the pH of the carcass. Depending on a number of factors such as type of animal and even breed, this decrease in pH can take anywhere from a single hour to many. It is vital to monitor pH during this phase as once the lowest pH value is reached, the pH will begin to slowly rise, indicating that decomposition has begun.

The pH value of meat influences its' water binding capacity which directly impacts consumer qualities such as tenderness and color. Lower pH values result in a lower water-binding capacity and lighter colors. Factors such as these can be important when considering how to efficiently produce meat products. For example, when producing dry sausages the meat must have a low water binding capacity so that it can dry evenly.

Depending on the type of the final product and the steps required to get there, pH values will vary throughout the meat processing industry. It is imperative, regardless of the final product, that pH be maintained at a low value to prevent bacterial spoilage and comply with food safety regulations. By monitoring pH values throughout the meat production process, you can ensure the creation of consistent and safe meat products.

HANNA
Instruments

pH / Temperature Meter for Meat

The HI98163 is a rugged, waterproof, portable pH meter that measures pH and temperature using the specialized FC2323 Foodcare pH electrode with AISI stainless steel piercing blade. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Ergonomic, rugged, waterproof (IP67) design

- Backlit, graphic LCD

- CAL Check™ to alert users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition

- Automatic or manual temperature compensation

- 200 hour battery life with battery level displayed on measurement screen

- Log-on-demand up to 200 samples (100 pH and 100 mV range)

- Auto hold to automatically hold the first stable reading on the display

- Calibration timeout to alert the user at a defined interval when the calibration has expired

- PC connectivity via a sealed opto-isolated micro USB and HI92000 software

- GLP to provide data from previous calibration to ensure Good Laboratory Practices are met

- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, PC software and connection cable, instruction manual, quick start guide, and batteries in a rugged, custom carrying case.

HI98163 includes FC2323 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

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Analytical Testing for the Food Industry

FC2323 pH / temperature probe for meat

FC2323 has been specially designed with a stainless steel blade tip for meat penetration.

Stainless steel piercing blade

The FC099 (35mm; 1.38") stainless steel blade can be attached to the probe for easy meat penetration. Piercing into the meat will allow for the pH glass and reference junction to be in contact with the sample for a direct pH measurement without extensive sample preparation.

Open junction reference

Clogging of the reference junction is a common challenge faced by food producers that measure pH in semi-solid products such as meat. The solids can easily clog the ceramic junction used with standard laboratory pH electrodes. The open junction design of the FC2323 resists clogging and continues to provide accurate, stable readings.

Conic tip shape

This design along with a piercing blade allows for the easy penetration into semisolids for the direct measurement of pH.

PVDF body

Polyvinylidene fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth.

Specifications		HI98163
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
	Calibration	up to five-point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and five custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
	Relative mV Offset Range	±2000 mV
Temperature*	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding probe error)
Ordering Information	**HI98163** is supplied with FC2323 pH electrode, FC099 meat piercing stainless steel blade, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), HI700630 electrode acid cleaning solution sachet for meat grease and fat deposits (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in a rugged carrying case with custom insert.	

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

pH / Temperature Meter for Meat

The Hanna Instruments HI99163 is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for meat analysis.

- Ergonomic, rugged, waterproof (IP67) design
- Quick Connect probe
- Multi-level LCD display with probe condition indicator
- Automatic Temperature Compensation (ATC)
- Automatic one or two-point pH calibration
- Calibration tags displayed on-screen
- Stability indicator for accurate data recording
- 1400 hour battery life
- Battery life indication and low battery detection
- Adjustable auto-off
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, instruction manual, and batteries in a rugged, custom carrying case.

QUICK DIN

HI99163 includes FC2323 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

Analytical Testing for the Food Industry

FC2323 pH / temperature probe for meat

FC2323 has been specially designed with a stainless steel blade tip for meat penetration.

Stainless steel piercing blade

The FC099 (35mm; 1.38") stainless steel blade can be attached to the probe for easy meat penetration. Piercing into the meat will allow for the pH glass and reference junction to be in contact with the sample for a direct pH measurement without extensive sample preparation.

Open junction reference

Clogging of the reference junction is a common challenge faced by food producers that measure pH in semi-solid products such as meat. The solids can easily clog the ceramic junction used with standard laboratory pH electrodes. The open junction design of the FC2323 resists clogging and continues to provide accurate, stable readings.

Conic tip shape

This design along with a piercing blade allows for the easy penetration into semisolids for the direct measurement of pH.

Viscolene electrolyte

The viscolene electrolyte offers a hard gel interface between the inner electrode components and the sample being measured. The electrolyte is silver-free for use in food products and is maintenance-free.

PVDF body

Polyvinylidene fluoride (PVDF) is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth.

Specifications		HI99163
pH*	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH; 0.01 pH
	Accuracy	±0.1 pH; ±0.02 pH
	Calibration	automatic, one or two-point calibration with two sets of standard buffers (standard pH 4.01, 7.01, 10.01 or NIST pH 4.01, 6.86, 9.18)
Temperature*	Range	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C (up to 60°C); ±1.0°C (outside) / ±1°F (up to 140°F); ±2.0°F (outside)
Ordering Information		**HI99163** is supplied with FC2323 pH electrode, FC099 meat piercing stainless steel blade, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700630 electrode cleaning solution sachets (2), 1.5V AAA batteries (3), instruction manual, and rugged carrying case.

* Limits will be reduced to actual probe/sensor limits.

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Analytical Testing for the Food Industry

pH in Milk

The measurement of pH in milk is important in testing for impurities, spoilage, and signs of mastitis infection. While there are a number of factors that affect the composition of milk, pH measurements can help producers understand what might be causing certain compositional changes. pH measurement is commonly performed at various points in a milk processing plant.

Fresh milk has a pH value of 6.7. When the pH value of the milk falls below pH 6.7, it typically indicates spoilage by bacterial degradation. Bacteria from the family of Lactobacillaceae are lactic acid bacteria (LAB) responsible for the breakdown of the lactose in milk to form lactic acid. Eventually when the milk reaches an acidic enough pH, coagulation or curdling will occur along with the characteristic smell and taste of "sour" milk.

Milk with pH values higher than pH 6.7 potentially indicate that the milk may have come from cows with a mastitis infection. Mastitis is an ever-present challenge with dairy milking cows. When infected, the cow's immune system releases histamine and other compounds in response to the infection. There is a resulting increase in permeability of endothelial and epithelial cell layers, allowing blood components to pass through a paracellular pathway. Since blood plasma is slightly alkaline, the resulting pH of milk will be higher than normal. Typically milk producers can perform a somatic cell count to detect a mastitis infection, but a pH measurement offers a quick way to screen for infection.

Understanding the pH of raw milk can also help producers optimize their processing techniques. For example, in operations that use Ultra High Temperature (UHT) processing, even small variations from pH 6.7 can affect the time required for pasteurization and the stability of the milk after treatment.

Measuring the pH of milk can provide a number of challenges. Milk products tend to have a high solids content that will coat the sensitive glass membrane surface and/or clog the reference junction. The FC1013 supplied with the HI98162 is specifically designed for measuring pH in milk. The Polyvinylidene fluoride (PVDF) body is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth. The FC1013 is an ideal general-purpose pH electrode for milk products that connects to the HI98162 with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

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pH / Temperature Meter for Milk

The HI98162 is a rugged, waterproof, Foodcare portable pH meter that measures pH and temperature using the specialized FC1013 probe for milk products. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Ergonomic, rugged, waterproof (IP67) design

- Backlit, graphic LCD

- CAL Check™ to alert users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition

- Automatic or manual temperature compensation

- 200 hour battery life with battery level displayed on measurement screen

- Log-on-demand up to 200 samples (100 pH and 100 mV range)

- Auto hold to automatically hold the first stable reading on the display

- Calibration timeout to alert the user at a defined interval when the calibration has expired

- PC connectivity via a sealed opto-isolated micro USB and HI92000 software

- GLP to provide data from previous calibration to ensure Good Laboratory Practices are met

- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, PC software and connection cable, instruction manual, quick start guide, and batteries in a rugged, custom carrying case.

HI98162 includes FC1013 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

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Analytical Testing for the Food Industry

FC1013 pH / temperature probe for milk

The HI98162 uses the FC1013 amplified pH electrode with PVDF body. This specialized electrode offers numerous features that improve pH testing for milk producers. An integrated temperature sensor allows for temperature compensated pH measurements without the need for a separate temperature probe. The contact between the bulb's large surface area and the milk sample ensures a stable calibration and measurement.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being tested. It is vital that this flow occurs in order to complete an electrical circuit, which ultimately determines the pH value. Any clogging of the junction will prevent completion of the circuit, resulting in readings that are erratic or constantly drifting.

This probe utilizes a secondary reference chamber with ceramic outer junction allowing aqueous silver free electrolyte to flow slowly through the porous ceramic frit providing accurate readings for aqueous samples.

PVDF body

The durable PVDF body of the FC1013 ensures pH measurements can be safely taken on the dairy farm or production floor. The components of the electrode are also able to withstand a wider range of temperatures to allow for accuracy during stages such as pasteurization, which requires heating to temperatures near 72°C (161°F).

Specifications		HI98162
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
	Calibration	up to five-point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
	Relative mV Offset Range	±2000 mV
Temperature*	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding probe error)
Ordering Information		**HI98162** is supplied with FC1013 pH electrode, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), HI700640 electrode cleaning solution sachet for milk deposits (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in a rugged carrying case with custom insert.

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

pH / Temperature Meter for Milk

The Hanna Instruments HI99162 is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for milk analysis.

- Ergonomic, rugged, waterproof (IP67) design
- Quick Connect probe
- Multi-level LCD display with probe condition indicator
- Automatic Temperature Compensation (ATC)
- Automatic one or two-point pH calibration
- Calibration tags displayed on-screen
- Stability indicator for accurate data recording
- 1400 hour battery life
- Battery life indication and low battery detection
- Adjustable auto-off
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, instruction manual, and batteries in a rugged, custom carrying case.

HI99162 includes FC1013 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

FC1013 pH / temperature probe for milk

The HI99162 uses the FC1013 amplified pH electrode with PVDF body. This specialized electrode offers numerous features that improve pH testing for milk producers. An integrated temperature sensor allows for temperature compensated pH measurements without the need for a separate temperature probe. The contact between the bulb's large surface area and the milk sample ensures a stable calibration and measurement.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being tested. It is vital that this flow occurs in order to complete an electrical circuit, which ultimately determines the pH value. Any clogging of the junction will prevent completion of the circuit, resulting in readings that are erratic or constantly drifting.

The FC1013 probe utilizes a secondary reference chamber with ceramic outer junction allowing aqueous silver free electrolyte to flow slowly through the porous ceramic frit providing accurate readings for aqueous samples.

PVDF body

The durable PVDF body of the FC1013 ensures pH measurements can be safely taken on the dairy farm or production floor. The components of the electrode are also able to withstand a wider range of temperatures to allow for accuracy during stages such as pasteurization, which requires heating to temperatures near 72°C (161°F).

Spheric glass tip

A large surface area provides optimal contact between the sensing bulb and aqueous milk sample.

Specifications		HI99162
pH*	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH; 0.01 pH
	Accuracy	±0.1 pH; ±0.02 pH
	Calibration	automatic, one or two-point calibration with two sets of standard buffers (standard pH 4.01, 7.01, 10.01 or NIST pH 4.01, 6.86, 9.18)
Temperature*	Range	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C (up to 60°C); ±1.0°C (outside) / ±1°F (up to 140°F); ±2.0°F (outside)
Ordering Information		**HI99162** is supplied with FC1013 pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700640 electrode cleaning solution sachets (2), 1.5V AAA batteries (3), instruction manual, and rugged carrying case.

* Limits will be reduced to actual probe/sensor limits.

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Analytical Testing for the Food Industry

pH in Yogurt

Monitoring pH is crucial in producing consistent, quality yogurt. Yogurt is made by the fermentation of milk with live bacterial cultures. Most yogurts are inoculated with a starter culture consisting of Lactobacillus bulgaricus and Streptococcus thermophilus. Once the live culture is added, the mixture of milk and bacteria is incubated, allowing for fermentation of lactose to lactic acid. The pH of the mixture drops and becomes more acidic due to the lactic acid production; it is this reduction in pH causes the casein protein in milk to coagulate and precipitate, resulting in a yogurt-like texture.

Yogurt producers cease incubation once a specific pH level is reached. Most producers have a desired point between pH 4.0 and 4.6 in which fermentation is stopped by rapid cooling. Within this range of pH there is an ideal amount of lactic acid present for yogurt, giving it the characteristic tartness, aiding in thickening, and acting as a preservative against undesirable strains of bacteria.

By verifying that fermentation continues to a predetermined pH endpoint, yogurt producers can ensure their products remain consistent in terms of flavor, aroma, and texture. A deviation from the predetermined pH can lead to a reduced shelf life of yogurt or create a product that is too bitter or tart. Syneresis can also occur if fermentation is stopped too early or too late, resulting in yogurt that is respectively too alkaline or too acidic. Syneresis is the separation of liquid, in this case whey, from the milk solids. Consumers expect yogurt to remain texturally consistent, so ensuring fermentation is stopped at the appropriate pH is vital to consumer perception.

Yogurt can provide a number of challenges for the person that needs to measure pH. Yogurt is a semi-solid to slurry that has a very high solids content. This type of sample will coat the sensitive glass membrane surface and/or clog the reference junction. The FC2133 that is supplied with the HI98164 is designed specifically for measuring pH in yogurt. From a conic tip shape for easy penetration to an open junction that resist clogging; the FC2133 is an ideal general-purpose pH electrode for yogurt products. The FC2133 connects to the HI98164 with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

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pH / Temperature Meter for Yogurt

The HI98164 is a rugged, waterproof, Foodcare portable pH meter that measures pH and temperature using the specialized FC2133 yogurt pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Ergonomic, rugged, waterproof (IP67) design
- Backlit, graphic LCD
- CAL Check™ to alert users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
- 200 hour battery life with battery level displayed on measurement screen
- Log-on-demand up to 200 samples (100 pH and 100 mV range)
- Auto hold to automatically hold the first stable reading on the display
- Calibration timeout to alert the user at a defined interval when the calibration has expired
- PC connectivity via a sealed opto-isolated micro USB and HI92000 software
- GLP to provide data from previous calibration to ensure Good Laboratory Practices are met
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, PC software and connection cable, instruction manual, quick start guide, and batteries in a rugged, custom carrying case.

HI98164 includes F2133 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

FC2133 pH / temperature probe for yogurt

The FC2133 amplified pH electrode is a specialized probe that offers numerous features that improve pH testing for yogurt producers. An integrated temperature sensor allows for temperature compensated pH measurements without the need for a separate temperature probe. The probe's conical sensing bulb ensures stable calibration and measurement in semi-solids and emulsions like yogurt.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being tested. It is vital that this flow occurs in order to complete an electrical circuit, which ultimately determines the pH value. Any clogging of the junction will prevent completion of the circuit, resulting in readings that are erratic or constantly drifting.

Clogging of the reference junction is a common challenge faced by yogurt producers

as the milk solids and proteins can easily build up on the electrode. The open junction design of the FC2133 utilizes a viscolene reference electrolyte that comes into direct contact with the yogurt sample. Without a physical junction, the electrode resists clogging and continues to provide accurate, stable readings.

Glass body

The glass body of the FC2133 is chemically resistant and quick to reach thermal equilibrium, allowing for a faster, more stable response when taking pH measurements in samples that are not at ambient temperature.

Specifications		HI98164
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
	Calibration	up to five-point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
	Relative mV Offset Range	±2000 mV
Temperature*	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding probe error)
Ordering Information	**HI98164** is supplied with FC2133 pH electrode, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), HI700643 electrode cleaning and disinfection solution sachet for yogurt products (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in a rugged carrying case with custom insert.	

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

pH / Temperature Meter for Yogurt

The Hanna Instruments HI99164 is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for yogurt analysis.

- Ergonomic, rugged, waterproof (IP67) design
- Quick Connect probe
- Multi-level LCD display with probe condition indicator
- Automatic Temperature Compensation (ATC)
- Automatic one or two-point pH calibration
- Calibration tags displayed on-screen
- Stability indicator for accurate data recording
- 1400 hour battery life
- Battery life indication and low battery detection
- Adjustable auto-off
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, instruction manual, and batteries in a rugged, custom carrying case.

HI99164 includes F2133 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

Analytical Testing for the Food Industry

FC2133 pH / temperature Probe for yogurt

The HI99164 uses the FC2133 amplified pH electrode with glass body. This specialized electrode offers numerous features that improve pH testing for yogurt producers. An integrated temperature sensor allows for temperature compensated pH measurements without the need for a separate temperature probe. The probe's conical sensing bulb ensures stable calibration and measurement in semi-solids and emulsions like yogurt.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being tested. It is vital that this flow occurs in order to complete an electrical circuit, which ultimately determines the pH value. Any clogging of the junction will prevent completion of the circuit, resulting in readings that are erratic or constantly drifting.

Clogging of the reference junction is a common challenge faced by yogurt producers as the milk solids and proteins can easily build up on the electrode. The open junction design of the FC2133 utilizes a viscolene reference electrolyte that comes into direct contact with the yogurt sample. Without a physical junction,

the electrode resists clogging and continues to provide accurate, stable readings.

Glass body

The glass body of the FC2133 is chemically resistant and quick to reach thermal equilibrium, allowing for a faster, more stable response when taking pH measurements in samples that are not at ambient temperature.

Conical glass tip

The conical shaped tip design allows for penetration into solids, semi-solids, and emulsions for the direct measurement of pH in samples such as yogurt.

Specifications		HI99164
pH*	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH; 0.01 pH
	Accuracy	±0.1 pH; ±0.02 pH
	Calibration	automatic, one or two-point calibration with two sets of standard buffers (standard pH 4.01, 7.01, 10.01 or NIST pH 4.01, 6.86, 9.18)
Temperature*	Range	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C (up to 60°C); ±1.0°C (outside) / ±1°F (up to 140°F); ±2.0°F (outside)
Ordering Information		**HI99164** is supplied with FC2133 pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700643 electrode cleaning solution sachets (2), 1.5V AAA batteries (3), instruction manual, and rugged carrying case.

* Limits will be reduced to actual probe/sensor limits.

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Analytical Testing for the Food Industry

pH in Cheese

pH is an essential measurement throughout the entire cheesemaking process. From the initial measurements of incoming milk to the final measurements of ripened cheese, pH is the most important parameter for cheese quality and safety control.

Acidification of milk begins with the addition of bacterial culture and rennet. The bacteria consume lactose and create lactic acid as a byproduct of fermentation. The lactic acid produced will cause the pH of the milk to go down. Once the milk reaches a particular pH, the rennet is added. The enzymes in rennet help to speed up curdling and create a firmer substance. For cheesemakers that dilute their rennet, the pH of the dilution water is also critical; water that is near pH 7 or higher can deactivate the rennet, causing problems with coagulation.

Once the curds are cut, stirred, and cooked, the liquid whey must be drained. The pH of whey at draining directly affects the composition and texture of the final cheese product. Whey that has a relatively high pH contributes to higher levels of calcium and phosphate and results in a stronger curd. Typical pH levels at draining can vary depending on the type of cheese; for example, Swiss cheese is drained between pH 6.3 and 6.5 while Cheddar cheese is drained between pH 6.0 and 6.2.

During brining, the cheese soaks up salt from the brine solution and loses excess moisture. The pH of the brine solution should be close to the pH of the cheese, ensuring equilibrium of ions like calcium and hydrogen. If there is an imbalance during brining, the final product can have rind defects, discoloration, a weakened texture, and a shorter shelf life.

Cheeses must fall within a narrow pH range to provide an optimal environment for microbial and enzymatic processes that occur during ripening. Bacterial cultures used in ripening are responsible for familiar characteristics such as the holes in Swiss cheese, the white mold on Brie rinds, and the aroma of Limburger cheese. A deviation from the ideal pH is not only detrimental to the ecology of the bacteria, but also to the cheese structure. Higher pH levels can result in cheeses that are more elastic while lower pH levels can cause brittleness.

Cheese products can provide a number of challenges for the person that needs to measure pH. Cheese products tend to be solid to semi-solids. Both types of samples will coat the sensitive glass membrane surface and/or clog the reference junction. The FC2423 that is supplied with the HI98165 is designed specifically for measuring pH in cheese. From a conic tip shape in a durable 5 mm diameter stainless steel body for easy penetration into cheese without leaving a large hole to an open junction that resist clogging; the FC2423 is an ideal general-purpose pH electrode for cheese. The FC2423 connects to the HI98165 with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

pH / Temperature Meter for Cheese

The HI98165 is a rugged, waterproof, portable Foodcare pH meter that measures pH and temperature using the specialized FC2423 cheese pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Ergonomic, rugged, waterproof (IP67) design
- Backlit, graphic LCD
- CAL Check™ to alert users to problems during calibration including dirty/ broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
- 200 hour battery life with battery level displayed on measurement screen
- Log-on-demand up to 200 samples (100 pH and 100 mV range)
- Auto hold to automatically hold the first stable reading on the display
- Calibration timeout to alert the user at a defined interval when the calibration has expired
- PC connectivity via a sealed opto-isolated micro USB and HI92000 software
- GLP to provide data from previous calibration to ensure Good Laboratory Practices are met
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, PC software and connection cable, instruction manual, quick start guide, and batteries in a rugged, custom carrying case.

HI98165 includes F2423 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

FC2423 pH / temperature probe for cheese

The HI98165 uses the stainless steel FC2423 amplified pH electrode. This specialized electrode offers numerous features that improve pH testing for cheese producers. The robust stainless steel sheath paired with the conical sensing tip allows for penetration in cheese at various points throughout the production process. An integrated temperature sensor also ensures that all pH measurements are compensated for temperature without the need for a separate temperature probe.

Low temperature glass

The FC2423 electrode uses Low Temperature (LT) glass for the sensing bulb. The LT glass tip is a lower resistance glass formulation. As the temperature of the sensing glass decreases, the resistance of the LT glass will increase approaching that of standard glass at ambient temperatures. The FC2423 is suitable to use with samples that measure from 0 to 50°C.

Stainless steel body

The AISI 316 stainless steel body offers durability in the production facility and can withstand chloride concentrations that cause corrosion in other types of alloys.

Conic glass tip

The conical shaped tip design allows for penetration into solids, semi-solids, and emulsions for the direct measurement of pH in samples such as cheese.

Specifications		HI98165
pH*	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH
	Calibration	up to five-point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
	Relative mV Offset Range	±2000 mV
Temperature*	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F) (excluding probe error)
Ordering Information	**HI98165** is supplied with FC2423 pH electrode, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), HI700642 electrode cleaning solution sachet for cheese residues (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in a rugged carrying case with custom insert.	

* Limits will be reduced to actual probe/sensor limits.

HANNA® instruments

pH / Temperature Meter for Cheese

The Hanna Instruments HI99165 is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for cheese analysis.

- Ergonomic, rugged, waterproof (IP67) design
- Quick Connect probe
- Multi-level LCD display with probe condition indicator
- Automatic Temperature Compensation (ATC)
- Automatic one or two-point pH calibration
- Calibration tags displayed on-screen
- Stability indicator for accurate data recording
- 1400 hour battery life
- Battery life indication and low battery detection
- Adjustable auto-off
- Supplied complete
  - Supplied complete with sensor, calibration and cleaning solutions, beakers, instruction manual, and batteries in a rugged, custom carrying case.

HI99165 includes F2423 pH probe with a quick connect DIN connector to make attaching and removing the probe simple and easy. Compatible with all pH electrodes that have a quick DIN connector.

FC2423 pH / temperature probe for cheese

The HI99165 uses the stainless steel FC2423 amplified pH electrode. This specialized electrode offers numerous features that improve pH testing for cheese producers. The robust stainless steel sheath paired with the conical sensing tip allows for penetration in cheese at various points throughout the production process. An integrated temperature sensor also ensures that all pH measurements are compensated for temperature without the need for a separate temperature probe.

Low temperature glass

The FC2423 electrode uses Low Temperature (LT) glass for the sensing bulb. The LT glass tip is a lower resistance glass formulation. As the temperature of the sensing glass decreases, the resistance of the LT glass will increase approaching that of standard glass at ambient temperatures. The FC2423 is suitable to use with samples that measure from 0 to 50°C.

Stainless steel body

The AISI 316 stainless steel body offers durability in the production facility and can withstand chloride concentrations that cause corrosion in other types of alloys.

Conic glass tip

The conical shaped tip design allows for penetration into solids, semi-solids, and emulsions for the direct measurement of pH in samples such as cheese.

Specifications		HI99165
pH*	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH
	Resolution	0.1 pH; 0.01 pH
	Accuracy	±0.1 pH; ±0.02 pH
	Calibration	automatic, one or two-point calibration with two sets of standard buffers (standard pH 4.01, 7.01, 10.01 or NIST pH 4.01, 6.86, 9.18)
Temperature*	Range	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C (up to 60°C); ±1.0°C (outside) / ±1°F (up to 140°F); ±2.0°F (outside)
Ordering Information		**HI99165** is supplied with FC2423 pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700642 electrode cleaning solution sachets (2), 1.5V AAA batteries (3), instruction manual, and rugged carrying case.

* Limits will be reduced to actual probe/sensor limits.

HANNA®
instruments

QUICK DIN
FC2323

DIGITAL
FC2320

B BNC
FC230B

Designed specifically for meat products.

FC2323, FC2320, FC230B

These amplified single junction pH electrodes have a built-in temperature sensor. These electrodes feature a food grade plastic PVDF body, an open junction design with viscolene gel electrolyte, a sensing bulb made of low temperature glass, and a conical tip shape.

FC098
20 mm
(0.8")

FC099
35 mm
(1.4")

Stainless steel blade for Meat pH electrodes

- Made of high grade stainless steel for long life
- Razor sharp for easy piercing into meat and other semi-solids
- Protects glass pH electrode from breakage
- Compatible with FC2323, FC2320 and FC230B

FC098 and FC099 stainless steel blades for meat penetration (optional).

QUICK DIN
FC2133

DIGITAL
FC2100

B BNC
FC210B

Designed for milk, yogurt, cheese, and other products in the dairy industry.

FC2133, FC2100, FC210B

These specialized probes were designed to improve pH testing for yogurt producers. These probes feature a conical sensing bulb to ensure stable calibration and measurement in semi-solids and emulsions like yogurt. Quick Connect Din and Digital models also incorporate an integrated temperature sensor for temperature compensated measurements

Clogging of the reference junction is a common challenge faced by yogurt producers as the milk solids and proteins can easily build up on the electrode. The open junction design of these probes utilize a viscolene reference electrolyte that comes into direct contact with the yogurt sample. Without a physical junction, the electrode resists clogging and continues to provide accurate, stable readings.

Analytical Testing for the Food Industry

FC2023 · QUICK DIN
FC2020 · DIGITAL
FC200B · BNC

Designed for dairy products such as yogurt and cheese, emulsions, cream, or other semi-solid samples.

FC2023, FC2020, FC200B

These PVDF bodied, gel filled pH electrodes feature an open junction design with viscolene gel electrolyte, a sensing bulb made of low temperature glass, and a conical tip shape. Quick Connect Din and Digital models also incorporate an integrated temperature sensor for temperature compensated measurements

FC2053 · QUICK DIN

Designed for dairy products, emulsions, cream, or other semi-solid samples.

FC2053

FC2053 is an amplified single junction pH electrode with an integrated temperature sensor. This electrode features a food grade plastic PVDF body with an easy to clean, removable sleeve, an open junction design with replaceable gel electrolyte, a sensing bulb made of low temperature glass, and a conical tip shape.

- Removable sleeve to extend probe life
  - Allows for cleaning of the outer reference area of any solids/semi-solids that get trapped during measurement.
  - Allows for the replacement of gel electrolyte.
- Built-in pre-amplifier for noise free measurements
- Food grade PVDF plastic body
  - Resistant to chlorine (bleach) that would be used for disinfection that comes in contact with the sample.

FC2423 · QUICK DIN
FC240B · BNC

Designed for cheese, dairy products, and quality control processes.

FC2423, FC240B

These stainless steel, amplified pH electrodes offer numerous features that improve pH testing for cheese producers. The robust stainless steel sheath paired with the conical sensing tip allows for penetration in cheese at various points throughout the production process. FC2423 also features an integrated temperature sensor to ensure that all pH measurements are compensated for temperature without the need for a separate temperature probe.

QUICK DIN

FC1013

Designed specifically for milk analysis.

FC1013

This amplified pH electrode offers numerous features to improve pH testing for milk producers. An integrated temperature sensor allows for temperature compensated pH measurements without the need for a separate temperature probe. The contact between the bulb's large surface area and the milk sample ensures a stable calibration and measurement.

The durable PVDF body of the FC1013 ensures pH measurements can be safely taken on the dairy farm or production floor. The components of the electrode are also able to withstand a wider range of temperatures to allow for accuracy during stages such as pasteurization, which requires heating to temperatures near 72°C (161°F).

BNC

FC220B

Designed for creams, sauces, or fruit juice samples.

FC220B

The FC220B is a glass body, single junction pH electrode. The FC220B electrode features a triple ceramic junction with refillable electrolyte, a sensing bulb made of low temperature glass, and a spherical tip shape. The recommended operating temperature range is from -5 to 70°C.

BNC

FC100B

Designed for sauces, juices, dairy products and other liquid or slurry forms of food.
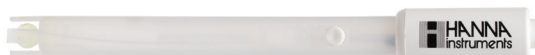
FC100B

This refillable, single ceramic, double junction pH electrode features a pH indicating probe made of general purpose glass and a food grade, PVDF plastic body.

Analytical Testing for the Food Industry

Q
QUICK DIN
HI10533

d
DIGITAL
HI10530

B
BNC
HI1053B

HI10533, HI10530, HI1053B

These glass body, refillable, double junction pH electrodes feature a triple ceramic junction in the outer junction and the conical pH sensing portion is made with low temperature glass. Quick Connect Din and Digital models also incorporate an integrated temperature sensor for temperature compensated measurements

Q
QUICK DIN
HI12303

d
DIGITAL
HI12300

B
BNC
HI1230B

Designed for field applications as well as general purpose use.

HI12303, HI12300, HI1230B

These plastic body, double junction, gel filled pH electrodes feature a single ceramic junction and the spherical pH sensing portion is made with general purpose glass. Quick Connect Din and Digital models also incorporate an integrated temperature sensor for temperature compensated measurements.

Q
QUICK DIN
HI11313

d
DIGITAL
HI11310

B
BNC
HI1131B

Designed for laboratory samples and other liquid samples, as well as general purpose use.

HI11313, HI11310, HI1131B

These glass body, refillable, double junction pH electrodes have a single ceramic junction in the outer reference cell and the spherical pH sensing portion is made with high temperature glass. Quick Connect Din and Digital models also incorporate an integrated temperature sensor for temperature compensated measurements

HANNA®
instruments

Bottles

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

pH Technical Buffer Solutions (±0.01 pH)

- Supplied with Certificate of Analysis
- Accuracy of ±0.01 pH @ 25°C
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.

Single-use sachets

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

Tech Tip

Two-point Calibration

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

pH Standard Buffer Solutions

- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.

- NIST traceability
  - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials.

- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.

- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.

- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in light-tight bottles that meet FDA requirements.

Bottles

pH Value @25°C	Code	Package
4.01	**HI7004M**	230 mL bottle
	HI7004L	500 mL bottle
	HI7004C	500 mL bottle, color coded solution
	HI7004/1L	1 L bottle, color coded solution
	HI7004/1G	1 G (3.78L) bottle, color coded solution
	HI8004L	500 mL (FDA bottle)
7.01	**HI7007M**	230 mL bottle
	HI7007L	500 mL bottle
	HI7007C	500 mL bottle, color coded solution
	HI7007/1L	1 L bottle, color coded solution
	HI7007/1G	1 G (3.78L) bottle, color coded solution
	HI8007L	500 mL (FDA bottle)
10.01	**HI7010M**	230 mL bottle
	HI7010L	500 mL bottle
	HI7010C	500 mL bottle, color coded solution
	HI7010/1L	1 L bottle, color coded solution
	HI7010/1G	1 G (3.78L) bottle, color coded solution
	HI8010L	500 mL (FDA bottle)

Single-use sachets

pH Value @25°C	Code	Package
4.01	**HI70004P**	20 mL sachets (25)
7.01	**HI70007P**	20 mL sachets (25)
10.01	**HI70010P**	20 mL sachets (25)

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

Specific Use Electrode Cleaning Solutions

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

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

Bottles

Code	Description	Size
HI7061L	general purpose cleaning solution	500 mL
HI70640L	cleaning solution for milk deposits	500 mL
HI70641L	cleaning and disinfection solution for dairy products	500 mL
HI70642L	cleaning solution for cheese deposits	500 mL
HI70643L	cleaning and disinfection solution for yogurt products	500 mL
HI70630L	acid cleaning solution for meat, grease and fats	500 mL
HI70631L	alkaline cleaning solution for meat, grease and fats	500 mL

Sachets

Code	Description	Size
HI700601P	general purpose cleaning solution	20 mL (25)
HI700640P	cleaning solution for milk deposits	20 mL (25)
HI700641P	cleaning and disinfection solution for dairy products	20 mL (25)
HI700642P	cleaning solution for cheese deposits	20 mL (25)
HI700643P	cleaning and disinfection solution for yogurt products	20 mL (25)
HI700630P	acid cleaning solution for meat, grease and fats	20 mL (25)

Analytical Testing for the Food Industry

Electrode Storage and Filling Solutions

Electrode Storage Solutions

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

Electrode Filling Solutions

Code	Description
HI7071	3.5M KCl with AgCl reference electrolyte, 30 mL bottle (4)
HI7082	electrolyte solution, 3.5M KCl, 30 mL bottle (4)
HI7082M	electrolyte solution, 3.5M KCl, 230 mL
HI7082L	electrolyte solution, 3.5M KCl, 460 mL

Electrode Filling Accessories

Code	Description
HI740157P	Electrode filling pipettes (20)

Tech Tip

Clean Sensors Weekly

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

Keep Bulb and Junctions Moist

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

Top-off electrolyte

Electrolyte levels in refillable electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution to ensure correct electrode performance.

HANNA instruments

Automatic Potentiometric (pH/mV/ISE) Titration Systems

Redesigned and improved

- Compact Design.
  - Takes up half the lab space compared to the HI900 family

- Redesigned electrode holder.
  - Spring-loaded actuator allows you to quickly raise or lower the stirrer/electrodes with the push of a button.
  - Space-saving geometry allows for sample sizes less than 50 mL.
  - Support rods mount directly to the titrator – no need for special mounting hardware.

- Peristaltic Pumps
  - Add reagents to your samples automatically before every titration using integrated peristaltic pumps.

Titrator capabilities

- Dynamic titrant dosing
  - The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

- Equivalence endpoint detection
  - Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

HANNA® instruments

Analytical Testing for the Food Industry

- Signal stability timing
  - The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.

- Multiple equivalence point detection (HI932 only)
  - HI932 can detect multiple equivalence points during one titration as specified and required in certain standard methods and applications.

- Method sequencing (HI932 only)
  - The HI932 offers users the option of linking two methods. This allows for two analyses to be run on the same sample including direct measurements, single endpoint titrations, multiple equivalence point titrations, and back titrations.

- Multiple titration types
  - Paired with the right electrode from our sensor line, our potentiometric titrators can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations, as well as back titrations (HI932 only) and titre determinations.

- Direct measurement functionality
  - The HI931 and HI932 performs as a high accuracy pH, ORP, and ion selective meter that can link, log, and report direct measurements. Users can easily track and manage data without the hassle of manual record keeping.

Burettes & Dosing System

- Exchangeable burette system
  - With Hanna's Clip-Lock™ burette feature, it only takes a few seconds to exchange titrants and reagents preventing cross-contamination and saving time.

- Multiple burette sizes
  - The HI931 and HI932 comes supplied with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette. Each burette is constructed with a ground glass syringe and chemically resistant PTFE plunger.

- Precision dosing pump
  - Our unmatched 40,000 step piston driven pump is capable of dosing extremely small and highly accurate volumes of titrant or reagent.

- Automatic reagent addition (HI932 only)
  - A second burette may be programmed to volumetrically dispense reagent prior to titration or direct measurement. This helps achieve consistent and accurate results and prevents operator errors such as incorrect volumes or forgetting reagent addition

Interface & display

- Interactive color display
  - A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values.

- Detailed titration graphs
  - A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Data

- Data storage
  - up to 100 titration and pH/mV/ISE reports. Transfer data via USB.

- Flexible GLP management
  - All necessary GLP (Good Laboratory Practice) information can be recorded with each sample.

HANNA®
instruments

Connectivity & functionality

- Multifunctional
  - These titrators also function as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple analyses can be performed on one sample.

- Multiple connections (HI932 only)
  - The HI932 offers device support for two analog boards, allowing up to two electrodes, two burettes, and two stirrers to be connected to one unit simultaneously.

Methods of analysis

- Customizable methods
  - These titrators can store up to 100 user-defined or standard titration and direct measurement methods. Each method may be modified and optimized for performance based on application and user requirements.

- Titration method support
  - Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support for any questions you might have along the way.

- Market specific methods packs
  - Hanna offers titration method packages for various markets including food, beverage, dairy, wine, and more. Ask our Sales Consultants about our library of market specific titration methods.

- Adaptable standard methods
  - Our technical experts can program and optimize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our titration systems.

Food Analysis Parameter Spotlight

Titratable acidity	Reducing sugars	Sulfite
Salt (NaCl)	Alkalinity	Calcium Direct Measure
Vitamin C (ascorbic acid)	Hardness	Chloride Direct Measure
Free fatty acids	Calcium	pH Direct Measure
Peroxide value	Magnesium (HI902/HI932 only)	Potassium Direct Measure
Acid number	Chloride	Sodium Direct Measure

- Autosampler connectivity (HI932 only)
  - The HI932 works seamlessly with our HI922 Autosampler featuring 16 or 18 sample tray options, automatic tray identification, and automatic beaker detection. Up to three peristaltic pumps for reagent addition and removal can be connected and real-time analysis and sequencing progress is visible on the HI932 display as well as indicated by the LED lights of the Autosampler.

HANNA® instruments

Specifications		HI932C1 / HI932C2	HI931
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH	
	Resolution	0.1; 0.01; 0.001 pH	
	Accuracy (@25°C/77°F)	±0.001 pH	
	pH Calibration	up to five-point calibration, eight standard buffers and five custom buffers	
mV	Range	-2000.0 to 2000.0 mV	
	Resolution	0.1 mV	
	Accuracy (@25°C/77°F)	±0.1 mV	
	mV Calibration	single-point offset	
ISE	Range	$1 \cdot 10^{-6}$ to $9.99 \cdot 10^{10}$	
	Resolution	1; 0.1; 0.01	
	Accuracy (@25°C/77°F)	±0.5% monovalent; ±1% divalent	
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards	
Temperature	Range	-5.0 to 105.0°C; 23.0 to 221.0°F; 268.2 to 378.2 K	
	Resolution	0.1°C; 0.1°F; 0.1K	
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error	
Additional Specifications	Analog Board(s) Capability	2	1
	Dosing Pump Capability	2	2
	Burette Included	1 (25 mL)	
	Burette Size Capability	5, 10, 25 and 50 mL	
	Burette Resolution	1/40000	
	Display Resolution	0.001 mL	
	Dosing Accuracy	±0.1% of full burette volume	
	Display	5.7" (320 x 240 pixel) backlit color LCD	
	GLP Conformity	instrumentation data storage and printing capabilities	
	Linked Methods	yes	no
	Back Titrations	yes	no
	HI921 Compatible	yes	no
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)	
Ordering Information	**HI932C1-01** (and **HI932C1-02** includes titrator with one analog board*. **HI932C2-01** and **HI932C2-02** includes titrator with two analog boards*. **HI931-01** and **HI931-02** includes titrator with one analog board*. All models also include: overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.		
Accessories	**HI930100**	dosing pump	
	HI930150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	
	HI930125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	
	HI930110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	
	HI930105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	

*Each Analog Board Provides: (1) BNC (pH/mV/ISE) Input, (1) Reference Input, (1)Temperature Input, (1) Stirrer Input

HANNA® instruments

Autosampler

Automate up to 18 samples

The HI922 Autosampler is an automated titration sample handling system designed for use with the HI932 Automatic Titration System, making multiple sample titrations quick and easy.

With the Autosampler, up to 18 samples can be run consecutively. The HI922 Autosampler interfaces directly with the HI932 to access titration methods. Once a titration method is established, the user can fully customize the automation sequence of their samples for this method. Sample names and size can be customized or auto-filled with preset values. One beaker can be designated for storage purposes before and after titration sequences; up to three beakers per tray can be designated for an electrode rinse sequence, allowing for sufficient removal of solutions that are hard to clean between each sample titration. During each sample titration, the real-time progress is shown on the HI932 display. Finished sample results and graphs can be accessed during and after the titrations have finished.

Once the Autosampler sequence is complete, two reports are available for review: a sequence report featuring a table outlining each sample name, beaker position, sample size, and result for the tray, and a detailed titration report for each individual sample, including the graph of the titration data.

16 or 18 Sample Tray

The HI922 is able to automate samples using a 16 sample tray or an 18 sample tray. The 16 sample tray holds 150 mL beakers; the 18 sample tray holds 100 mL beakers. The Autosampler trays are composed of chemically resistant materials and are removable to allow for easy handling. The dishwasher safe trays provide a quick and simple way for users to clean regularly.

Built-in Magnetic Stirrer

A magnetic stirrer comes built-in with each Autosampler tray. Users simply need to add a small magnetic stir bar to each beaker to ensure homogeneity during titrations. An optional overhead propeller stirrer can also be installed for use instead of the built-in stirrer. The HI922 allows users to easily adjust the stirring speed of both the built-in and overhead stirrers for optimal use.

Built-in RFID

The HI922 sample trays feature a built-in RFID reader that is able to communicate the tray size and serial number of each tray. Users can have multiple trays, each designated to a specific set of samples. The RFID reader can ensure that the appropriate tray is used each time.

HANNA®
instruments

Control Panel

The included control panel features multiple buttons to allow for manual operation of the Autosampler tray, electrode holder, and any auxiliary pumps. A two-line backlit display on the handheld panel clearly displays status information. Manual control with the control panel is desirable for calibration, sample preparation, and method optimization.

Absolute Encoder

The Autosampler consistently tracks the tray position without the need to "home" or calibrate.

Barcode Reader

A USB-compatible barcode reader can be used to associate names with each sample for improved organization of data.

Optical IR Beaker Detection

An optical IR beam is able to detect the presence or absence of beakers within the sample tray. Users can dictate the Autosampler action if a beaker is missing from the tray during a titration sequence. If a beaker is detected as missing, the HI921 can skip over the sample or stop the titration sequence.

Electrode Rinse Feature

Up to 3 beakers per tray can be designated for electrode dip/spray rinses.

Sample Leveling Feature

Automatic leveling for fast preparation of volumetric samples.

Waste Removal Feature

Aspirate completed samples into a waste container.

Versatile Electrode Holder

The durable electrode holder is able to accommodate three 12 mm electrodes, a temperature sensor, one aspiration tube, and five multipurpose tubes. The multipurpose tubes can be utilized for actions such as reagent addition or burette dosing.

Use with the HI932 Automatic Titration System

Flexible, accurate detection of the titration endpoint with HI932 potentiometric titrator.

Real-time progress of the sequence and results shown on the HI932 titrator screen.

HANNA®
instruments

Peristaltic and Membrane Pumps

- Up to three peristaltic pumps can be added at anytime

- User replaceable pump systems

- Peristaltic pumps
  - Uses high performance plastic that is engineered to be chemically resistant and have long service life.
  - Reagent addition, sample leveling, waste removal
  - Greater than 200 mL/min flow

- Membrane pumps
  - Simple plug connection for tubing
  - Greater than 400 mL/min flow

Users can add up to three peristaltic pumps or one membrane pump at any time with the user-replaceable pump systems on the HI922. The peristaltic pumps use high performance plastic that is engineered to be chemically resistant with a long service life. These pumps have a flow greater than 200 mL/min and can be utilized for reagent addition, sample leveling, and waste removal. The membrane pump is a simple plug connection for tubing that has a flow greater than 400 mL/min.
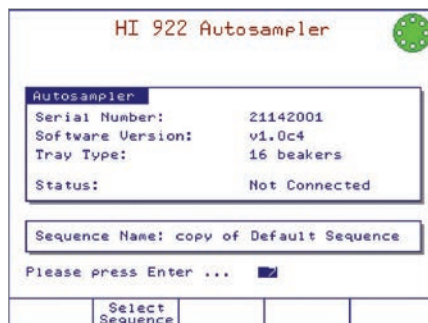
RFID recognition

Sample trays are automatically detected and identified when placed on the Autosampler.
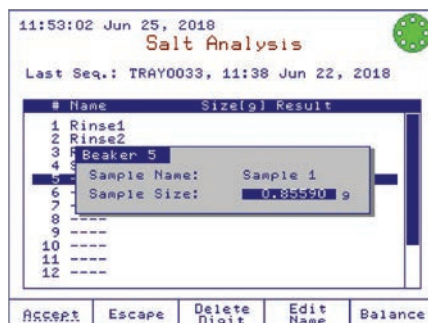
Digital balance compatibility

Sample weights are communicated when connected to a digital balance.

Speedy sample entry

Sample names can be automatically incremented for speedy sample identification.

HANNA instruments

Analytical Testing for the Food Industry

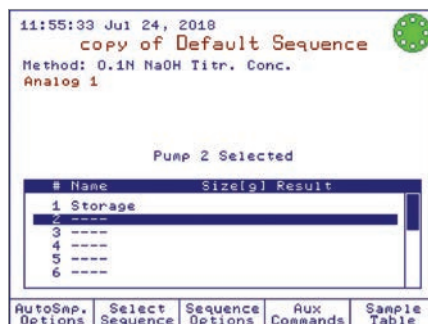| Specifications	HI922
Electrode Holder Slots	3 x 12-mm electrodes
	1 temperature sensor
	1 aspiration tube
	5 multi - purpose slots (titrant/reagent tubes)
	1 overhead stirrer
Temperature Sensor	HI7662-A (included)
Stirrers	built-in magnetic stirrer
	overhead propeller stirrer (optional)
Peristaltic Pumps	up to 3 can be installed
	installs in slots #1, 2, 3
Membrane Pump (for cleaning)	installs in slot #4
Trays	16 beakers x 150 mL (HI920-11660)
	18 beakers x 100 mL (HI920-11853)
	built-in RFID, transmits the tray type and serial number to Autosampler
Beakers	ASTM short-form glass beakers
	HI920-060 (120 mL), fits HI920-11660 tray - 20 plastic beakers
	HI920-053 (100 mL), fits HI920-11853 tray - 20 plastic beakers
Control Panel	buttons for manual operation of tray and titration head
	manual operation of peristaltic or membrane pumps
	2-line backlit display with status information
Barcode Reader	compatible with USB barcode readers, used to add sample names
Report Storage	up to 40 trays of samples (e.g.: 720 reports for 18-beaker tray)
Ordering Information	Choose your Autosampler configuration:

HI922 – [x] [y] [z]

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

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Karl Fischer Volumetric Titrator

for Moisture Determination

The HI933 is an automatic volumetric Karl Fischer titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of sample types/matrices, allowing the user to obtain both good results and high-speed analysis. The HI933 analyzes for water content ranging from 100 ppm to 100%. This powerful titrator automatically dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing.

- Small footprint, requires minimal bench space
- Casing made with strong, chemically resistant plastic
- Powerful built-in algorithms for termination criteria based on fixed mV endpoint or absolute/relative drift
- Titrant standardization and sample analysis averaging
- Minimized water vapor entry with the Sealed Solvent System
- Balance interface for automatic weighing
- Support for 100 titration methods
- User-customizable reports
- Clearly displayed warning and error messages

HANNA instruments

Analytical Testing for the Food Industry

Burette and Dosing System

Precision Dosing Pump

Our unmatched 40,000 step piston driven pump is capable of delivering as little as 0.125 µL of titrant accurately and precisely.

Anti-Diffusion Dispensing Tip

A specially designed glass dispensing tip delivers titrant precisely into high turbulence mixing zones, ensuring a rapid reaction. Its angular construction helps prevent titrant from diffusing into the sample solvent.

Chemically Resistant Tubing and Syringe

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Titration and Solvent System

Efficient Sample Handling

The HI933 features a quick-remove sample port with a replaceable rubber septum allowing for fast and easy sample introduction to the titration vessel. An integrated magnetic stirrer ensures homogeneity for an accurate and speedy reaction.

Chemically Resistant Titration Vessel

The glass and PTFE titration cell and fittings are designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

The titration vessel is completely sealed to minimize exposure to ambient humidity, keep the system dry, and reduce titrant consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds without opening the titration vessel.

Visually Recognizable Desiccant

A rechargeable, color-indicating, silica gel desiccant prevents the ingress of ambient humidity into the sealed system while maintaining full titrator functionality. The desiccant color change allows a user to recognize when it's adsorption capacity has depleted and is ready for replacement or recharging.

Interface and Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, dosing size, titration volume, drift rate, and mV value.

Simple & Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Titrator Capabilities

Dynamic Titrant Dosing

The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Drift Rate Compensation

HI933 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Titrant Recordkeeping

The HI933's titrant database can store information for up to 20 titrants. The database may be programmed to remind a user when to standardize their titrant, reducing error in analysis.

Selectable Endpoint Criteria

HI933 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Termination criteria can be chosen based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Data and Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI933 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI933 Karl Fischer system.

Moisture in Food

Moisture content regulates the shelf life of food and is important to measure in both the product and the packaging materials. Regularly monitoring moisture content ensures efficiency and optimum quality in processed foods. Hanna offers Karl Fischer Titrators for moisture determination in foods and beverage products. Hanna offers the HI933 Volumetric Karl Fischer Titrator for samples with up to 100% water and the HI934 Coulometric Karl Fischer Titrator for samples with water content less than 5%. With an average time per test less than 5 minutes, Karl Fischer Titrators provide a solution for timely quality control testing in house, eliminating the cost and waiting time associated with outside laboratory results. Karl Fischer Titrators are able to quickly, accurately and efficiently determine the moisture content in food products.

Specifications		HI933
Measurement	Range	100 ppm to 100%
	Resolution	1 ppm (0.0001%)
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg/pc, µg/pc
	Sample Type	liquid or solid
Determination	Pre-Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop or absolute drift stop
	Dosing	dynamic with optional pre-dispensing
	Result Statistic	mean, standard deviation
Titration System	Dosing Pump Resolution / Accuracy	1/40000 of the burette volume (0.125 µL per dose) with 5 mL burette / ±0.1% of full burette volume
	Syringe	5 mL precision ground glass with PTFE plunger
	Valve	motor-driven 3-way, PTFE liquid contact material
	Tubing	PTFE with light block and thermal jacketing
	Dispensing Tip	glass, fixed position, anti-diffusing
	Titration Vessel	conical with operation volume between 50-150 mL
	Solvent Handling System	sealed system, integrated diaphragm air pump
Electrode	Type	HI76320 dual platinum pin, polarization electrode
	Connection	BNC
	Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
	Voltage Range / Resolution	2 mV to 1000 mV / 0.1 mV
	Accuracy (@25°C/77°F)	±0.1 %
Stirrer	Type	magnetic, optically regulated, digital stirrer
	Speed	200-2000 rpm
	Resolution	100 rpm
Storage	Methods	Up to 100 (standard and user) methods
	Reports	Up to 100 complete titration reports and drift rate reports
Additional Specifications	Peripheral Device Compatibility	PC (USB Standard B); Flash Drive (USB Standard A); Analytical Balance (DB-9 Socket); Printer (DB-25 Socket); Keyboard (6-pin Mini DIN)
Ordering Information		**HI933-01** and **HI933-02** are supplied with HI76320 dual platinum pin electrode, dosing pump, 5 mL burette assembly with tubing, air pump assembly with tubing, beaker and bottle top assemblies and all fittings, desiccant cartridges (4) with indicating desiccant, stir bar, waste bottle, calibration key, USB cable, power cable, USB flash drive, quality certificate, ISO 8655 burette compliance report and instruction manual binder.

Karl Fischer Coulometric Titrator

The HI934 is an Karl Fischer coulometric titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of applications, allowing the user to obtain both good results and high-speed analysis. The HI934 analyzes for water content ranging from 1 ppm to 5%. This powerful titrator effectively monitors the KF reaction, detects the endpoint, and performs all necessary calculations and graphing.

- Small footprint, requires minimal bench space
- Casing made with strong, chemically resistant plastic
- Powerful built-in algorithms for termination criteria based on fixed mV endpoint or absolute/relative drift
- Sample analysis averaging and statistical data
- Minimized water vapor entry with the sealed solvent system
- Balance interface for automatic weighing
- Support for 100 titration methods
- User-customizable reports
- Clearly displayed warning and error messages

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Coulometric Reagent System

Precision Iodine Generation

Hanna's dosing algorithm allows for an extremely small amount of iodine necessary for the Karl Fischer reaction to be generated electrolytically using a pulsed current up to 400 mA delivering titrant accurately and precisely.

Titration and Solvent System

Chemically Resistant Titration Vessel and Tubing

The glass titration cell and PTFE tubing is designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

Ground glass joints completely seal the glass titration cell minimizing exposure to ambient humidity, keeping the system dry, and reducing reagent consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds with a quick fitting adjustment.

Molecular Sieve Desiccant

High efficiency molecular sieve desiccant helps maintain low and stable drift rates within the titration cell while preventing the ingress of ambient humidity into the sealed solvent system.

Digital built-in stirrer

Automatic, integrated magnetic stirrer adjustable from 200-2000 RPM with optical feedback for automatic speed control.

Titrator Capabilities

Dynamic Titrant Dosing

The titration speed feature allows for timely and accurate titration results by relating the amount of iodine generated to the mV response from the Karl Fischer reaction.

Drift Rate Compensation

The HI904 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Selectable Endpoint Criteria

The HI934 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Users may choose termination criteria based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Interface & Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, drift rate, and mV value.

Simple and Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

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- Fritless (No Diaphragm) Generator
  - Uses one easy-to-replace Karl Fischer reagent
  - Lower and more stable drift rates
  - Easier cleaning of generator cell

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

Data & Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI904 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI904 Karl Fischer system.

Specifications		HI934
Measurement	Range	1 ppm to 5%
	Resolution	0.1ppm
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, ppt, mgBr/100g, gBr/100g, mgBr, gBr
	Sample Type	liquid or solid (external dissolution or extraction)
Determination	Pre Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop, or absolute drift stop
	Dosing	Dynamic with 3 speed settings
	Result Statistic	mean, standard deviation
Titration Vessel	Type	Borosilicate glass with standard taper glass joint connections
	Operating Volume	100 to 200 mL
	Septum	Silicone rubber
	Septum Cap Thread	GL-18
	Reagent Port	Standard Taper 19
Detector Electrode	Type / Connection	dual platinum pin, polarization electrode / BNC connector
	Glass Connection	Standard Taper 14/20
	Polarization Current	1, 2, 5, or 10 µA
	Voltage Range	5 mV to 1200 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1%
Generator Electrode	Type	diaphragm or diaphragm-less
	Electrode Type Detection	Automatic
	Electrical Connection	5-pin connector with detachable cable
	Glass Connection	Standard Taper 29/12
	Maximum Current	400 mA
	Current Control	Automatic or Fixed (400 mA)
Stirrer	Type	Magnetic, electronic regulated, digital stirrer
	Speed	200 to 2000 RPM
	Resolution	100 RPM
	External Stirrer	6-pin mini DIN Connection allows for the control of an external stirring apparatus
Reagent Handling System	Type	Sealed system with integrated diaphragm air pump
	Desiccant Type	Molecular Sieves
	Bottle Thread Type	GL-45
	Glass Connection	Standard Taper 19 (using supplied adapter)
	Reagent/Waste Tubing	PTFE
Additional Specifications	Peripheral Device Compatibility	PC (USB Standard B); Flash Drive (USB Standard A); Analytical Balance (DB-9 Socket); Printer (DB-25 Socket); Keyboard (6-pin Mini DIN)
Ordering Information	**HI934D-01** and **HI934D-02** are supplied with diaphragm, **HI934-01** and **HI934-02** are supplied without diaphragm	
	All Models Include: dual platinum pin electrode, air pump assembly, titration vessel assembly (glass vessel, accessory port stopper, sample port cap and septum, stir bar, desiccant, desiccant cartridge, fittings), vessel support with adapter, pump locking screw with plastic head, reagent bottle assembly (bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), water bottle assembly (waste bottle, bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), calibration key, reagent exchange adapter, accessory holder assembly, joint grease, Karl Fischer generator electrode (removable generator electrode cable), USB cable, USB storage device, HI900 PC application software, power adapter, quality certificate and instruction manual binder.	

*100-240 VAC
"-01" models, US plug (type A)
"-02" models, European plug (type C)

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85

Reagents

HI70401	potassium hydrogen phthalate, 20 g
HI70402	tartaric acid, 20 g
HI70403	sodium thiosulfate pentahydrate, 20 g
HI70404	potassium iodide powder packets, 100 packets
HI70405	glucose/fructose, 20 g
HI70406	sodium chloride, 20 g
HI70407	potassium iodate, 20 g
HI70408	oxalic acid, 20 g
HI70409	potassium permanganate, 20 g
HI70422	silver nitrate (0.1 M), 1L
HI70423	sodium hydroxide solution (0.11 N), 1 L
HI70424	amino-propanol buffer, 25 mL
HI70425	sulfuric acid solution (16%), 500 mL
HI70426	glyoxal solution (40%), 100 mL
HI70427	nitric acid solution (1.5 M), 500 mL
HI70428	sodium hydroxide solution (0.25N), 1 L
HI70429	silver nitrate solution (0.05 M), 1L
HI70432	hydrogen peroxide solution (3%), 25 mL
HI70433	stabilized iodine solution (0.01 N), 1L
HI70434	phosphoric acid (85%), 500 mL
HI70435	sodium hydroxide solution (5 M), 500 mL
HI70436	deionized water, 1 G
HI70437	potassium Iodide concentrated (30%) solution, 500 mL
HI70438	tris buffer set, 1 L
HI70439	sodium thiosulfate solution (0.1 M), 1 L
HI70440	iodine stabilized solution (0.02 N), 1 L

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

HANNA®instruments Analytical Testing for the Food Industry

Bromide ISE

Code	HI4102
Type	solid-state; combination
Measurement Range	1M to 1•10^{-6}M 79910 to 0.08 mg/L (ppm)
Optimum pH Range	2 to 12.5
Temperature Range	0 to 80°C
Approximate Slope	-56
Body Material	PEI
Ordering Information	**HI4102** combination ISE with 1 m coaxial cable and BNC connector
Accessories	**HI4002-01** 0.1 M bromide standard, 500 mL
	HI4000-00 ISA for halide ISEs, 500 mL
	HI7072 silver-free reference electrolyte fill solution, 1 M KNO$_3$, 30 mL (4)
	HI4000-70 halide polishing strips (24)

Chloride ISE

Code	HI4107
Type	solid-state; combination
Measurement Range	1M to 5•10^{-5}M ; 35500 to 1.8 mg/L (ppm)
Optimum pH Range	2 to 11
Temperature Range	0 to 80°C
Approximate Slope	-56
Body Material	PEI
Ordering Information	**HI4107** combination ISE with 1 m coaxial cable and BNC connector
Accessories	**HI4007-01** 0.1 M chloride standard, 500 mL
	HI4007-02 100 mg/L (ppm) chloride standard, 500 mL
	HI4007-03 1000 mg/L (ppm) chloride standard, 500 mL
	HI4000-00 ISA for halide ISEs, 500 mL
	HI7072 silver-free reference electrolyte fill solution, 1 M KNO$_3$, 30 mL (4)
	HI4000-70 halide polishing strips (24)

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Calcium ISE

Code	HI4104
Type	polymer membrane; combination
Measurement Range	1M to 3•10⁻⁶M; 40080 to 0.12 mg/L (ppm)
Optimum pH Range	4 to 10
Temperature Range	0 to 40°C
Approximate Slope	+28
Body Material	epoxy/PVC
Ordering Information	**HI4104** combination ISE with 1 m coaxial cable and BNC connector

Accessories		
	HI4004-01	0.1 M calcium standard, 500 mL
	HI4004-00	ISA for calcium ISEs, 500 mL
	HI7082	silver-free reference electrolyte fill solution, 3.5 M KCl, 30 mL (4)
	HI4004-45	conditioning and storage solution for HI4004 and HI4104 calcium ISEs
	HI4104-51	calcium module for HI4104 combination ISE

Measurement Range: 1M to $3 \cdot 10^{-6}$M; 40080 to 0.12 mg/L (ppm)

⎍ Parameter Highlight

Calcium

Daily consumption of calcium helps to support a variety of functions within the human body, from heart health to bone density. Calcium can be sourced from food, vitamins, and supplements. Characteristically, dairy products, such as milk, yogurt, and cheese, contain the highest amounts of naturally based calcium per serving size when compared across all food groups. Other food products, such as orange juice and tofu may be fortified with calcium, where calcium is added during production from a synthetic source. For reporting and labeling requirements, calcium may need to be measured and recorded so that the customer is aware of the amount of calcium consumed per serving size. The calcium ion-selective electrode (ISE) provides an accurate and reliable way to measure calcium in a variety of food products. Equipped with an organic polymer sensing membrane, the calcium ISE is sensitive to free calcium ions dissolved in solution. The calcium ISE comes as either a half-cell design, where the sensing and reference electrodes are in two separate electrodes, or as a combination with both sensing and reference housed in one body. Both come equipped with an exchangeable sensing membrane that can be easily replaced when needed.

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Iodide ISE

Code	HI4111
Type	solid-state; combination
Measurement Range	1M to $1\cdot10^{-7}$M; 127000 to 0.01 mg/L (ppm)
Optimum pH Range	2 to 13
Temperature Range	0 to 80°C
Approximate Slope	-56
Body Material	PEI
Ordering Information	**HI4111** combination ISE with 1 m coaxial cable and BNC connector

Accessories		
	HI4011-01	0.1 M iodide standard, 500 mL
	HI4000-00	ISA for halide ISEs, 500 mL
	HI7072	silver-free reference electrolyte fill solution, 1 M KNO_3, 30 mL (4)
	HI4000-70	halide polishing strips (24)

B
BNC

HI4111

Silver/Sulfide ISE

Code	HI4115
Type	solid-state; combination
Measurement Range	1.0M to $1\cdot10^{-6}$M; 107900 to 0.11ppm (Ag^+); 1.0M to $1\cdot10^{-7}$M; 32100 to 0.003 ppm (S^{2-})
Optimum pH Range	2 to 8 (Ag^+); 12 to 14(S^{2-})
Temperature Range	0 to 80°C
Approximate Slope	+56 (Ag+) / -28 (S^{2-})
Body Material	PEI
Ordering Information	**HI4115** combination ISE with 1 m coaxial cable and BNC connector

Accessories		
	HI4015-01	0.1 M silver standard, 500 mL
	HI4000-00	ISA for halide ISEs, 500 mL
	HI4015-00	SAOB (sulfide antioxidant buffer), 500 mL + 18 g (2 components)
	HI7072	silver-free reference electrolyte fill solution, 1 M KNO_3, 30 mL (4)
	HI4000-70	halide polishing strips (24)

B
BNC

HI4115

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Nitrate ISE

Code	HI4113
Type	polymer membrane; combination
Measurement Range	1.0M to $1\cdot10^{-5}$M; 6200 to 0.62 mg/L (ppm); 1400 to 0.4 mg/L (ppm) as N
Optimum pH Range	3.0 to 8
Temperature Range	0 to 40°C
Approximate Slope	-56
Body Material	PEI/PVC
Ordering Information	**HI4113** combination ISE with 1 m coaxial cable and BNC connector
Accessories	**HI4013-01** 0.1 M nitrate standard, 500 mL
	HI4013-02 100 mg/L (ppm) nitrate standard (as N), 500 mL
	HI4013-03 1000 mg/L (ppm) nitrate standard (as N), 500 mL
	HI4013-00 ISA for nitrate ISEs, 500 mL
	HI4013-06 nitrate interferent suppressant ISA, 500 mL
	HI7078 electrolyte solution, $(NH_4)_2SO_4$, 30 mL (4)
	HI4113-53 nitrate module for HI 4113 combination ISE (3 pack)

Parameter Highlight

Nitrate

Nitrate ions can be found in a wide variety of foods, both naturally occurring and as a food additive. Small concentrations of nitrate occur naturally in fruits and vegetables; nitrate is taken into the plant from the soil as a source of nitrogen. The concentration of naturally occurring nitrates is dependent upon growing conditions, where factors include the use of fertilizer, soil characteristics, light intensity and exposure, water availability and presence of nitrate in the water itself. Nitrates are also used as food additives, especially in processed meats such as sausages. Typically added as sodium or potassium salts, nitrate prevents bacterial growth, preserves coloring and extends the shelf life of foods. Public health concerns exist regarding the effects of nitrates and its derived compounds in food. Excessive amounts of nitrate can cause illness in both infants and adults. In response, the Joint Expert Committee on Food Additives (JECFA) of the Food and Agriculture Organization (FAO) and World Health Organization (WHO) reviewed and recognized safety guidelines. JEFCA established an acceptable daily intake of 0 to 3.7 milligrams of nitrate per kilogram of body weight. Nitrates can be easily measured in food with a nitrate ion selective electrode (ISE), which is proven as a reliable and accurate measurement technique for food applications. With a durable PEI/PVC probe body and replaceable polymer membrane sensor, the nitrate ISE can be used with Hanna's compatible meters in a wide variety of food industries.

Potassium ISE

Code	HI4114
Type	polymer membrane; combination
Measurement Range	1.0M to 1•10⁻⁶M; 39100 to 0.039 mg/L (ppm)
Optimum pH Range	1.5 to 12.0
Temperature Range	0 to 40°C
Approximate Slope	+56
Body Material	PEI/PVC
Ordering Information	**HI4114** combination ISE with 1 m coaxial cable and BNC connector

Accessories		
	HI4014-01	0.1 M potassium standard, 500 mL
	HI4014-00	ISA for potassium ISEs, 500 mL
	HI7076	electrolyte solution, 1 M NaCl, 30 mL (4)
	HI4114-51	potassium module for combination ISE

⎍ Parameter Highlight

Potassium in Foods and the Potassium ISE

Potassium is an important component in the diet because it aids in several bodily functions, including muscle growth and contraction, protein production and regulation of fluids, blood pressure and heart rate. Consuming too little potassium can cause fatigue and irritability, while individuals on dialysis or with kidney problems should avoid consuming too much potassium. Potassium-rich foods include several fruits and vegetables, meats, milk, yogurt and nuts. Foods naturally high in potassium, while also low in sodium, have been found to lower the risks of high blood pressure, stroke, kidney stones and bone loss during aging. Recommended daily intake of potassium depends on an individual's age and ranges from 3,000 to 4,700 mg; the FDA established the Daily Value for potassium at 3,500 mg. Potassium can be measured in aqueous solutions with a potassium ion selective electrode (ISE), which operates by potentiometric determination of free potassium ions. Potassium ISEs can be used for a wide range of concentrations, pH values, and temperatures, so they are ideal for use in many applications, especially in the food and beverage industries.

Sodium ISE

Code	FC300B
Type	glass combination
Measurement Range	1M to $1 \cdot 10^{-5}$M; 22990 to 0.23 ppm
Optimum pH Range	9.75 to 14 pH
Temperature Range	0 to 80°C
Approximate Slope	+57
Body Material	glass
Ordering Information	**FC300B** combination ISE with 1 m coaxial cable and BNC connector

Accessories		
	HI4016-01	0.1 M sodium standard, 500 mL
	HI4016-02	100 ppm sodium standard, 500 mL
	HI4016-03	1000 ppm sodium standard, 500 mL
	HI4016-00	ISA for sodium ISEs, 500 mL
	HI7079	2M NH_4Cl sat. with AgCl electrolyte for sodium ISEs (contains AgCl), 30 mL (4)
	HI4016-10	10 ppm sodium standard, 500 mL
	HI4016-45	storage solution for sodium ISE, 500 mL
	HI4016-46	conditioning solution for sodium ISE, 500 mL

⭐ Application Highlight

Sodium in Foods and Beverages

Sodium is a mineral that is present in many foods and beverages, most commonly in the form of sodium chloride, or salt. Salt occurs naturally in some foods, and it is often added as a flavor enhancer and to prevent spoiling. The addition of salt contributes to the quality of the product, controls the activity of enzymes and regulates water content. A small quantity of sodium is needed in one's diet to aid in bodily functions, but consuming too much sodium poses significant health concerns, such as hypertension and osteoporosis. Hypertension or high blood pressure, can lead to heart disease. Sodium content in packaged foods is monitored by the FDA.

Several instrumental methods are available for determining sodium concentration in foods and beverages. For binary solutions, sodium content can be inferred by measuring salt with a refractometer or an electrical conductivity (EC) meter. For more complex foods and beverages, sodium can be measured directly with a sodium ion selective electrode (ISE), indirectly with a chloride ISE or by potentiometric titration of the chloride ion to infer NaCl. Other methods that directly measure sodium, including inductively coupled plasma mass spectrometry (ICP-MS) and flame atomic absorption spectrophotometry (FAAS) provide highly accurate results at low concentrations, but the sophisticated technology is very expensive.

HANNA® instruments   Analytical Testing for the Food Industry

Acidity in Food and Beverages

Acidity in food and beverages is an important factor for the taste and composition of many products. Different from pH, which simply indicates whether a substance is an acid or a base, acidity indicates the concentration of the acid in the solution. The acidity of a substance is determined by titration; a base of a known concentration is added to a sample until all acids in the sample have been reacted with. The total acidity is typically expressed as the predominant acid. For example, the predominant acid in orange juice is citric acid. The AOAC Method 942.15 is commonly used to measure the titratable acidity various fruit products to a pH endpoint of pH 8.1. The AOAC Method 947.05 is used to determine the acidity of milk, which is reported as % lactic acid. This method specifies using a phenolphthalein color indicator or a pH electrode and meter to determine a pH endpoint of pH 8.2 or pH 8.3. The advantages of utilizing a pH electrode over a phenolphthalein color indicator are that color changes are subjective, especially when working with an opaque sample such as milk. Utilizing a pH meter or automatic titration system provides improved accuracy and repeatability for acidity determinations in food and beverages.
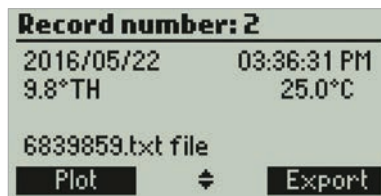
B
BNC

HI84529 includes FC260B glass bodied pH half-cell with BNC connector and HI5315 reference electrode with BNC connector.

Titratable Acidity Mini Titrator and pH Meter for Dairy

The HI84529 is an easy to use, fast and affordable automatic mini titrator designed for testing titratable acidity levels in dairy products. Based on an acid-base titration method, this mini titrator uses an optimized pre-programmed method of analysis with a powerful algorithm that determines the completion of the titration reaction by the use of a specialized foodcare pH electrode.

- Piston-driven pump with dynamic dosing
  - For highly accurate, repeatable results.
- CAL Check™
  - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken electrodes.
- Log-on-demand
  - Log data up to 400 samples (200 for titration; 200 for pH/mV).
- Automatic stirrer speed control
  - Maintains stirrer speed at 600 RPM regardless of viscosity of solution.

- Graphic mode/exportable data
  - Displays in-depth data on titration, which can then be stored and exported to either a USB drive or PC using the USB connection.
- GLP features
  - Date, time, offset, slope and buffers used.
- pH/mV meter
  - Doubles as a benchtop pH meter.
- Easy-to-use interface
  - Intuitive design with large keys and easy to navigate screens.

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- **Titration curve displayed on screen**
  - The HI84529 offers real time graphing of the titration curve on the LCD.

- **Log-on-demand**
  - The HI84529 can log up to 400 samples (200 for titration; 200 for pH/mV) and recall or export data to a USB drive or PC.

Specifications		HI84529
Titrator	Range	Low Range: %l.a.: 0.01 to 0.20; °SH: 0.4 to 8.9; °D: 1.0 to 20.0; °Th: 1.1 to 22.2 High Range: %l.a.: 0.1 to 2.0; °SH: 4.4 to 88.9; °D: 10 to 200; °Th: 11.1 to 222.2
	Resolution	Low Range: %l.a.: 0.01 ; °SH: 0.1; °D: 0.1; °Th: 0.1 High Range: %l.a.: 0.1; °SH: 0.1; °D: 1; °Th: 0.1
	Accuracy (@25°C/77°F)	Low Range: ± 0.01 %l.a.; High Range: ± 0.1 %l.a.
	Method	acid-base titration
	Sample Size (LR 20)	20 mL or 20 g
	Sample Size (LR 50)	50 mL or 50 g
	Sample Size (HR 20)	20 mL or 20 g
	Principle	endpoint titration, adjustable (pH 8.0 - 8.7 in 0.1 increments)
	Pump Speed	10 mL/min
	Stirring Speed	800 (Low Range) / 1000 (High Range)
pH Meter	Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
	Resolution	0.1 pH / 0.01 pH
	Accuracy (@25°C/77°F)	±0.01 pH
	Calibration	one, two or three-point calibration; four available buffers (pH 4.01, 6.00, 8.30, 10.01)
	Temperature Compensation	manual or automatic
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	± 1.0 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy	±0.4°C; ±0.8°F; ±0.4 K
Ordering Information	**HI84529-01** (115V) and **HI84529-02** (230V) are supplied with HI84529-70 Reagent Kit for titratable acidity in dairy products, FC260B pH electrode, HI5315 reference electrode, HI7662-M temperature probe, HI7072 fill solution (30 mL), HI700640 cleaning solution for milk deposits (2 x 20 mL), capillary dropper pipette, 100 mL beakers (2), dosing pump valve, 5 mL syringe, 1 mL plastic pipette, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, power adapter, instruction manual and quality certificate.	
Reagents	**HI84529-50**	titrant solution for low range 20, 120 mL
	HI84529-51	titrant solution for high range 20, 120 mL
	HI84529-52	titrant solution for low range 50, 120 mL
	HI84529-55	pump calibration standard, 230 mL

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instruments

B
BNC

HI84532 includes HI1131B glass bodied pH electrode with BNC connector.

Titratable Acidity Mini Titrator and pH Meter for Fruit Juice

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

- Piston-driven pump with dynamic dosing
  - For highly accurate, repeatable results.
- CAL Check™
  - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken electrodes.
- Log-on-demand
  - Log data up to 400 samples (200 for titration; 200 for pH/mV).
- Automatic stirrer speed control
  - Maintains stirrer speed at 600 RPM regardless of viscosity of solution.

- Graphic mode/exportable data
  - Displays in-depth data on titration, which can then be stored and exported to either a USB drive or PC using the USB connection.
- GLP features
  - Date, time, offset, slope and buffers used.
- pH/mV meter
  - Doubles as a benchtop pH meter.
- Easy-to-use interface
  - Intuitive design with large keys and easy to navigate screens.

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Analytical Testing for the Food Industry

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

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

Specifications		HI84532
Titrator	Titratable Acidity Range	Low Range (5 mL sample): g/100 mL as citric acid: 0.10 to 2.00% CA; g/100 mL as tartaric acid: 0.11 to 2.35% TA; g/100 mL as malic acid: 0.10 to 2.09% MA High Range (5 mL sample): g/100 mL as citric acid: 1.00 to 10.00% CA; g/100 mL as tartaric acid: 1.17 to 11.72% TA; g/100 mL as malic acid: 1.05 to 10.47% MA
	Titratable Acidity Resolution	0.01%
	Accuracy (@25°C/77°F)	± 0.02% CA or 3% of reading whichever is greater
	Titration Method	acid-base titration
	Principle	endpoint titration: 8.1 pH
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
pH Meter	Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
	Resolution	0.1 pH / 0.01 pH
	Accuracy (@25°C/77°F)	±0.01 pH
	Calibration	one, two or three-point calibration; four available buffers (4.01, 7.01, 8.20, 10.01)
	Temperature Compensation	manual or automatic
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	± 1.0 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Ordering Information	**HI84532-01** (115V) and **HI84532-02** (230V) are supplied with HI84532-70 reagent Kit for titratable acidity in fruit juice, HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution (30 mL), 100 mL beakers (2), 20 mL beaker, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), dosing pump valve, 5 mL syringe, 1 mL plastic pipette, stir bar, power adapter, instruction manual and quality certificate.	
Reagents	**HI84532-50**	titrant solution for low range, 120 mL
	HI84532-51	titrant solution for high range, 120 mL
	HI84532-55	pump calibration standard, 230 mL

HANNA instruments

Research Grade Conductivity/TDS Meter

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

The HI5321 is an advanced research grade benchtop EC/TDS/Salinity/Resistivity meter that is completely customizable with a large color LCD and capacitive touch keys.

Customizable User Interface

The user interface of the HI5321 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

HI5321 has a color, graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing.

Auto-ranging

The meter can be set to auto-ranging in which the meter chooses the appropriate conductivity range from seven ranges or fixed range in which the meter will only display reading in µS/cm or mS/cm.

GLP Data

HI5321 includes a GLP Feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data include date, time, standards used for calibration.

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Automatic Temperature Compensation

All readings are automatically compensated for temperature variations with a built in temperature sensor.

Data Logging

Three selectable logging modes are available on the HI5321: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Data Transfer

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

Four-ring Conductivity Probe

All readings are performed with the HI76312 four-ring conductivity probe with a built in temperature sensor for automatic temperature correction. The four rings are made with platinum and the body of the electrode is made of Polyetherimide (PEI) plastic that is resistant to many harsh chemicals.

Specifications		HI5321
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm actual EC*
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Calibration	automatic standard recognition, user standard, single-point / multi-point calibration
	EC Calibration Solution	84.00 µS/cm, 1.413 mS/cm, 5.000 mS/cm, 12.88 mS/cm, 80.00 mS/cm, 111.8 mS/cm
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±2% of reading (±1 Ω•cm)
Salinity	Range	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%
	Resolution	0.01 for practical scale/natural sea water scale; 0.1% for percent scale
	Accuracy	±1% of reading
	Calibration	percent scale–one-point (with HI7037 standard); all others through EC
Temperature**	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
Ordering Information		**HI5321-01** (115V) and **HI5321-02** (230V) are supplied with HI76312 EC/TDS probe, 1413 µS/cm conductivity standard sachet (4), 12880 µS/cm conductivity standard sachet (2), 5000 µS/cm conductivity standard sachet (2), electrode rinse solution sachet (2), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

(*) Uncompensated conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
(**) Reduced to actual probe limits

HANNA® instruments

Professional Waterproof Meter

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

HI98192 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.000 μS/cm to 400 mS/cm, as well as TDS, resistivity and three salinity scales. This meter offers a quick connect four-ring probe and allows the user to adjust the nominal cell constant. HI98192 is also ready to perform all three stages of USP <645> method required for EC measurement of ultrapure water.

Backlit Graphic LCD Display

The HI98192 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

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

Quick connect probe

The HI763133 four-ring stainless steel conductivity probe features a quick connect DIN connector to make attaching and removing the probe simple and easy.

Data Logging

The HI98192's allows storage of up to 400 log-on-demand samples or 1000 lot logging samples that can be later transferred to a PC with the supplied HI920015 USB cable and HI92000 software.

GLP

Comprehensive GLP functions are directly accessible by pressing the GLP key. Calibration data, including date, time and calibration values are stored for retrieval at a later time.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 100 hours of battery life.

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PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI920015 micro USB cable and HI92000 software.

Rugged custom carrying case

The HI98192 meter, probe, and all accessories are supplied in a rugged carrying case.

Specifications		HI98192
EC	Range	0 to 400 mS/cm (shows values up to 1000 mS/cm actual conductivity)** 0.001 to 9.999 µS/cm*; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (autoranging)
	Resolution	0.001 µS/cm*; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 µS/cm, 84.0 µS/cm, 1.413 mS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
TDS	Range	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm* (autoranging)
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 KΩ•cm; 0.1 KΩ•cm; 1 KΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm*
	Accuracy	±1% of reading (±10 Ω or 1 digit, whichever is greater)
Salinity	Range	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
	Calibration	max. one-point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Temperature †	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two-point
Ordering Information		**HI98192** is supplied with HI763133 stainless steel, four-ring conductivity/TDS probe, HI7031M 1413 µS/cm calibration solution (230 mL), HI7035M 111.8 mS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720192 rugged carrying case with custom insert.

* The 0.000 µS/cm EC range and 0.1 MΩ•cm resistivity range are not available with the optional 4 m cable probe
**Uncompensated temperature reading
(†) Reduced to actual sensor limits

HANNA® instruments

Research Grade Bench Meter

Dissolved Oxygen and BOD

The HI5421 is rich in features including data logging, alarm limits, comprehensive GLP, and much more.

Customizable User Interface

The user interface of the HI5421 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

The HI5421 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.

Capacitive Touch

The HI5421 features sensitive capacitive touch buttons for accurate keystrokes when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching measurement modes and four virtual keys that change based upon use. The capacitive touch technology ensures the buttons never get clogged with sample residue.

Built in Barometer

Readings are compensated for barometric pressure by a built in pressure transducer located in the meter. Calibration of the barometric pressure is single-point with manual entry of current value obtained from local weather service or other device. Barometric pressure is displayed in a multiple choice of units including mmHg, mbar, kPa, mHg, psi, and atm.

Choice of Calibration

Automatic standard recognition is available for two points at 0% and 100% saturation or 0 mg/L and 8.26 mg/L. A user standard option is available for a user defined value.

BOD, OUR and Sour Measurement Modes

An additional three measurement modes are available to measure Biological Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR). Simply enter values and take readings at appropriate times and the meter will automatically calculate the values.

Automatic Salinity Compensation

The HI5421 allows for automatic salinity compensation with a selectable salinity range of 0 to 45 g/L.

GLP Data

View calibration data and calibration expiration information by selecting the Good Laboratory Practice (GLP) display option. Calibration data include date, time, and calibration points.

Data Transfer

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

Data Logging

Three selectable logging modes are available on the HI5421: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

D
DIN

HI5421 includes HI76483 DO probe.

Specifications		HI5421
Dissolved Oxygen	Range	0.00 to 90.00 ppm (mg/L); 0.0 to 600.0 % saturation
	Resolution	0.01 ppm; 0.1% saturation
	Accuracy	±1.5% of reading ±1 LSD
	Calibration	automatic using single or two-point calibration; user calibration single-point
Barometric Pressure	Range	450 to 850 mmHg; 600 to 1133 mBar; 60 to 133 KPa; 17 to 33 inHg; 8.7 to 16.4 psi; 0.592 to 1.118 atm
	Resolution	1 mmHg; 1 mBar; 1 kPa; 1 inHg; 0.1 psi; 0.001 atm
	Accuracy	±3 mm Hg + 1 least significant digit
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
Ordering Information		**HI5421-01** (115V) and **HI5421-02** (230V) is supplied with HI76483 DO probe, HI7041S electrolyte solution (30 mL), DO membrane caps (2), O-rings for DO membrane cap, HI76404W electrode holder, 12 VDC adapter, quality certificates, quick start guide and instruction manual.

opdo

Optical Dissolved Oxygen Meter

Design Features

- Digital optical probe with Quick Connect

- IP67 rated waterproof, rugged enclosure

- Clear, dot matrix display with multifunction virtual keys

- Dedicated HELP key

Technical Features

- Percent saturation or concentration measurements (mg/L)

- Automatic temperature compensation with one-point temperature calibration

- Salinity compensation
  - Salinity compensation allows for direct determination of dissolved oxygen in saline waters.
  - Users can set the salinity value.

- Calibration timeout
  - Flags when calibration is due at a specified interval.

- Built-in calculations
  - Biochemical Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR) modes.

- Built-in barometer
  - Automatic barometric pressure compensation with one-point calibration
  - Displays pressure in user-selectable units (mmHg, inHg, atm, psi, kPa, mbar).

- Data logging capability
  - Continuous data logging (with selectable intervals), log on demand, or stability.

HI98198 includes HI764113 optical DO probe with protective sleeve and a quick connect DIN connector to make attaching and removing the probe simple and easy.

- GLP
  - GLP data provides calibration data including date, time, pressure, calibrated value, temperature and salinity value of the last five calibrations

- PC connectivity via opto-isolated USB Type-C

- Displays temperature in °C or °F

- Approximately 200 hours of continuous use using 4 AA batteries

Analytical Testing for the Food Industry

HI764113 Rugged Optical Dissolved Oxygen Probe

- Digital, weighted probe
- No membranes
- No electrolytes
- No oxygen consumption
- No flow dependence or minimum flow rate
- Fast and stable readings
- Not affected by sunlight

- Factory-calibrated "Smart Cap"
- Smart Caps last one year
- Minimal maintenance

Smart Cap

Stainless steel, weighted protective guard

RFID tag

Smart Cap

Smart Cap with RFID communication stores factory-calibration coefficients.

The domed surface helps repel surface bubbles and provides increased luminophore surface area for better measurement sensitivity.

Specifications

Dissolved Oxygen	Range	0.00 to 50 mg/L (ppm); 0.0 to 500.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@25°C/77°F)	±1% of reading ±1 digit (0-20 mg/L); ±5% of reading (>20 mg/L)
	Calibration	automatic one or two-point at 100 % (8.26 mg/L) and 0 % (0 mg/L); manual one-point using a value entered by the user in % saturation or mg/L
Atmospheric Pressure	Range	420 to 850 mmHg
	Resolution	1 mmHg
	Accuracy (@25°C/77°F)	±3 mmHg within ±15% from the calibration point
	Calibration	one-point at any in range pressure value
Temperature	Range	-5.0 to 50.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy (@25°C/77°F)	±0.3°C; ±0.4°F (probe + meter)
	Calibration	one-point at any in range temperature value
Ordering Information	**HI98198** is supplied with HI764113 optical DO probe with protective sleeve, HI7040 bi-component zero oxygen solution (230 mL + 30 mL), 100 mL plastic beaker (2), 1.8 m USB Type-C cable, 1.5V AA batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert.	

Laboratory Research Grade Benchtop pH/mV and EC/TDS/ Salinity/Resistivity Meters

with or without ISE measurement

The HI5522 and HI5521 are advanced research grade benchtop meters that are completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. HI5522 measures pH/mV/ISE and EC/TDS/Salinity/Resistivity while HI5521 measures pH/mV and EC/TDS/Salinity/Resistivity. These meters are rich in features including ISE incremental methods (HI5522), data logging, alarm limits, comprehensive GLP, and much more. These meters also feature dedicated keys for routine operation and virtual keys for setup options.

Analytical Testing for the Food Industry

Highly customizable user interface

These meters can display measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data.

Capacitive touch

The capacitive touch technology ensures the buttons never get clogged with sample residue.

Color graphic LCD

The HI5522 and HI5521 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing and virtual keys provide for an intuitive user interface.

Two independent channels

The two measurement channels of these meters are galvanically isolated to eliminate noise and instability.

Choice of calibration

Automatic buffer recognition, semiautomatic, and direct manual entry pH calibration options are available for calibrating up to five points, from a selection of eight standard buffers and up to five custom buffers. For the conductivity channel the calibration can be set to automatic standard recognition or user entry along with a choice of single or multi-point. Calibration can be performed up to four points when multi-point is selected.

GLP data

HI5522 and HI5521 includes a GLP Feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data include date, time, standards used for calibration.

Four-ring conductivity probe

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

CAL Check™

CAL Check alerts users to potential problems during the calibration of the pH electrode. Indicators include "Electrode Dirty/Broken," "Buffer Contaminated," electrode response time and the overall probe condition as a percentage that is based on the offset and slope characteristics.

ISE measurement with choice of concentration units (HI5522 only)

The HI5522 allows for calibration and readings in choice of concentration units. The choices of concentration units include ppt, g/L, mg/mL, ppm, mg/L, µg/L, ppb, µg/L, mg/mL, M, mol/L, mmol/L, %w/v and a user-defined unit.

ISE measurement with Incremental Methods (HI5522 only)

The known addition, known subtraction, analyte addition, and analyte subtraction incremental methods are pre-programmed into the HI5522. Simply follow the on screen guided procedure and the meter will perform the calculation automatically allowing for a higher level of accuracy to be obtained as compared to a direct ISE measurement.
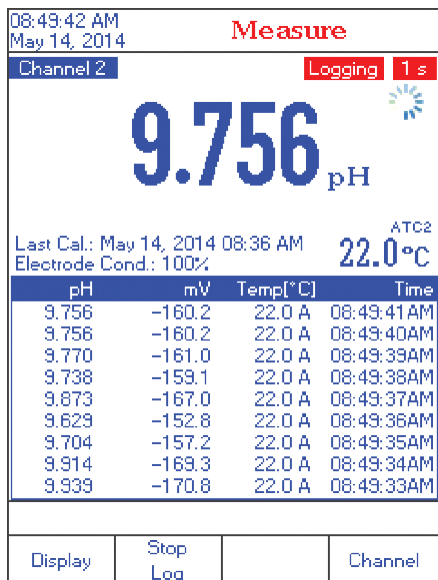
Data logging

Three selectable logging modes are available: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Data transfer

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

Contextual help

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

HI5522 Dual Channels

HI5521 Dual Channels

The two measurement channels of the HI5522 and HI5521 are galvanically isolated to eliminate noise and instability.

B **BNC** HI5522 and HI5521 includes the HI1131B pH electrode and are also compatible with all pH electrodes that use BNC connectors. HI5522 is also compatible with ISE electrodes that use BNC connectors.

D **DIN** HI5522 and HI5521 includes HI76312 four-ring EC/TDS probe.

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Specifications		HI5522 / HI5521
pH**	Range	-2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five-point calibration, eight standard buffers available, and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
ISE (HI5522 only)	Range	1×10^{-6} to 9.99×10^{10} concentration
	Resolution	1; 0.1; 0.01; 0.001 concentration
	Accuracy	±0.5% (monovalent ions); ±1% (divalent ions)
	Calibration	automatic, up to five-point calibration, five fixed standard solutions available for each measurement unit, and five user defined standards
Temperature**	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm absolute EC*
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Calibration	automatic standard recognition, user standard single-point / multi-point calibration
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±2% of reading (±1 Ω•cm)
Salinity	Range	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%
	Resolution	0.01 for practical scale/natural sea water scale; 0.1% for percent scale
	Accuracy	±1% of reading
	Calibration	percent scale–one-point (with HI7037 standard); all others through EC
Ordering Information		**HI5522-01** (115V) and **HI5522-02** (230V) are supplied with HI1131B pH electrode, HI76312 EC/TDS probe, HI7662-T temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), pH 10.01 buffer solution sachet (2), 1413 µS/cm conductivity standard sachet (2), 12880 µS/cm conductivity standard sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.
		HI5521-01 (115V) and **HI5521-02** (230V) are supplied with HI1131B pH electrode, HI76312 EC/TDS probe, HI7662-T temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (4), pH 10.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

(*) Absolute conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
** limits will be reduced to actual sensor limits

Alkalinity Test Kit

The HI3811 is a titration-based chemical test kit that determines the alkalinity concentration in samples within a 0 to 100 mg/L (ppm) $CaCO_3$ or 0 to 300 mg/L $CaCO_3$ range.

- Complete setup
  - All required materials are included with the test kit, such as the sample beakers, plastic syringe, phenolphthalein indicator, and bromophenol blue indicator.
- Replacement reagents available
  - The HI3811-100 can be ordered to replace the reagents supplied with the kit

Specifications	HI3811 Alkalinity (as $CaCO_3$*)
Type	titration
Range	0-100 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 3 mg/L (ppm)
Method	phenolphthalein/bromphenol blue
Number of Tests	110 avg.
Ordering Information	**HI3811** test kit comes with 10 mL phenolphthalein indicator, 10 mL bromophenol blue indicator, 120 mL alkalinity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe with tip.
Reagent	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg

Chloride Test Kit

The HI3815 is a chemical test kit that measures chloride by titration with mercuric nitrate. The HI3815 is supplied complete with all of the reagents and equipment necessary to perform approximately 110 tests.

- Pre-made reagents for ease of use
- All reagents marked with expiration date and lot number for traceability
- Manual titration performed with diphenylcarbazone indicator

Specifications	HI3815 Chloride (as Cl^-)
Type	titration
Range	0-100 mg/L (ppm) 0-1000 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 10 mg/L (ppm)
Method	mercuric nitrate
Number of Tests	110 avg.
Ordering Information	**HI3815** test kit comes with 15 mL diphenylcarbazone indicator, 30 mL nitric acid solution, 120 mL mercuric nitrate solution, 50 mL calibrated vessel, 10 mL calibrated vessel, calibrated syringe with tip.
Reagent	**HI3815-100** Chloride, 110 tests avg

*1 gpg = 17 ppm $CaCO_3$

Analytical Testing for the Food Industry

Free & Total Chlorine Test Kit

Low, Medium and High Range
with Checker® Disc

Specifications	HI38020 Free & Total Chlorine (as Cl_2)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm) 0.0-10.0 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm) 0.5 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	**HI38020** test kit comes with HI93701-0 free chlorine reagent (100 packets), HI93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes
Reagent	**HI38020-200** free & total chlorine, 200 tests avg.

Free Chlorine Test Kit

Low and Medium Range
with Checker® Disc

Specifications	HI38018 Free Chlorine (as Cl_2)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	**HI38018** test kit comes with HI93701-0 free chlorine reagent (200 packets), demineralizer bottle with cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes.
Reagent	**HI38018-200** free chlorine, 200 tests avg.

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Free Chlorine Test Kit

With Color Cube

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

Parameter Highlight

Chlorine

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms, and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection by-products.

Free Chlorine Test Kit

Medium Range with Checker® Disc

Specifications	HI3875 Free Chlorine (as Cl_2)
Type	checker disc
Range	0.0-3.5 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	DPD
Number of Tests	100 avg.
Ordering Information	**HI3875** test kit comes with HI93701-0 free Cl reagent (100 packets), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI3875-100** free chlorine, 100 tests avg.

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Dissolved Oxygen Test Kit

Specifications	HI3810 Dissolved Oxygen
Type	titration
Range	0.0-10.0 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	modified Winkler
Number of Tests	110 avg.
Ordering Information	**HI3810** test kit comes with 30 mL manganous sulfate solution, 30 mL alkali-azide reagent, 60 mL sulfuric acid solution (2), 10 mL starch indicator, 120 mL titrant solution, glass bottle with stopper, 10 mL calibrated vessel and calibrated syringe with tip.
Reagent	**HI3810-100** dissolved oxygen, 100 tests avg.

⭐ Application Highlight

Dissolved Oxygen in Fruit Juice

Understanding the concentration of dissolved oxygen in beverage production is extremely important. Increased DO content during the processing and storage of fruit juices can contribute to ascorbic acid degradation, as well as affecting color and flavor. Ascorbic acid is an essential food component and a natural antioxidant present in a variety of fruits and juices. It functions as an enzymatic electron donor and aids in iron absorption. During juice storage, ascorbic acid degradation due to DO present can occur over hours or weeks depending on such conditions as temperature, light, packaging permeability and pH. DO oxidation of ascorbic acid and other chemical species can lead to the formation of brown-colored compounds in a juice product, which is unappealing to a customer. Additionally, dissolved oxygen degradation of ascorbic acid can serve as a precursor to the formation of undesirable aldehydes, affecting aroma and flavor. Several methods can be employed to reduce the amount of dissolved oxygen present including vacuum-deaeration, gas sparging and membrane deaeration leading to an improvement in overall product quality. Dissolved oxygen measurements ensure quality and efficiency of fruit juice production.

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Water Hardness & CIP Systems

Foodborne illness is one of the most common public health issues in the United States, with approximately 76 million food-related illnesses occurring each year. In an effort to minimize foodborne illness, the United States Public Health Service (USPHS) closely inspects and regulates the country's food production. As a result, cleanliness is among the primary directives of any food processing plant to ensure compliance with the USPHS. Large food processing plants utilize clean-in-place (CIP) systems, which permit the cleaning of process machinery without having to completely disassemble the equipment. Unlike conventional cleaning systems where production must be halted for disassembly, cleaning and reassembly, CIP systems allow production processes to run continuously. An additional benefit to CIP systems is lower production costs, as there is no need for manual intervention. However, since there is minimal human involvement, both water and chemicals used for the CIP process must be monitored to ensure that they are suitable for cleaning purposes.

Water hardness is caused by dissolved salt ions, predominantly calcium and magnesium. Hardness in water poses a significant issue in CIP systems, as it can interfere with the effectiveness of sanitizers and caustic detergents. Water hardness also contributes to scale buildup in both the CIP equipment and process equipment. Scaling greatly reduces cleaning efficiency and consequently increases the costs of operation. As a result, the selection and concentration of chemicals used to treat cleaning water must be determined based on the extent of hardness. In circumstances where hardness exceeds 100 mg/L, the concentration of chemicals in cleaning solutions must be increased. However, if hardness exceeds 500 mg/L, water must be treated with a softener such as phosphate or EDTA. These softeners are added to detergents, and function by chelating the main constituents of hardness: calcium and magnesium. By removing calcium and magnesium from the water, detergents and sanitizers can work effectively. Optimal, efficient CIP systems ultimately require monitoring the hardness of the source water.

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Total Hardness Test Kit

The HI38033 is a titration-based chemical test kit that determines the total hardness concentration within the 0 to 30 grains per gallon (gpg) range. The HI38033 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

Specifications	HI38033 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0-30 gpg
Smallest Increment	1 gpg
Method	EDTA
Number of Tests	100 avg.
Ordering Information	**HI38033** test kit comes with 30 mL buffer solution, 10 mL calmagite indicator, 75 mL EDTA solution (2), 20 mL plastic beaker with cap and 1 mL plastic pipette.
Reagent	**HI38033-100** total hardness (*as $CaCO_3$), 100 tests avg.

Total Hardness Test Kit

The HI3812 is a titration-based chemical test kit that determines the total hardness concentration in two ranges: 0.0 to 30.0 mg/L and 0 to 300 mg/L. The HI3812 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

Specifications	HI3812 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	0.3 mg/L (ppm) 3 mg/L (ppm)
Method	EDTA
Number of Tests	100 avg.
Ordering Information	**HI3812** test kit comes with 30 mL hardness buffer, 10 mL calmagite indicator, 120 mL EDTA solution, 20 mL plastic beaker with cap, 50 mL plastic beaker with cap and 1 mL syringe with tip.
Reagent	**HI3812-100** total hardness (*as $CaCO_3$), 100 tests avg.

* 1 gpg = 17 ppm $CaCO_3$

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Total Hardness Test Kit

Low Range

Specifications	HI3840 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0-150 mg/L (ppm)
Smallest Increment	5 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3840** test kit comes with 30 mL hardness LR reagent and 50 mL calibrated vessel.
Reagent	**HI3840-050** total hardness LR (*as $CaCO_3$), 50 tests avg.

Total Hardness Test Kit

Medium Range

Specifications	HI3841 Total Hardness (*as $CaCO_3$)
Type	titration
Range	40-500 mg/L (ppm)
Smallest Increment	20 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3841** test kit comes with 30 mL hardness MR reagent and 50 mL calibrated vessel.
Reagent	**HI3841-050** total hardness MR (*as $CaCO_3$), 50 tests avg.

Total Hardness Test Kit

High Range

Specifications	HI3842 Total Hardness (*as $CaCO_3$)
Type	titration
Range	400-3000 mg/L (ppm)
Smallest Increment	100 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3842** test kit comes with 30 mL hardness HR reagent and 50 mL calibrated vessel.
Reagent	**HI3842-050** total hardness HR (*as $CaCO_3$), 50 tests avg.

* 1 gpg = 17 ppm $CaCO_3$

HANNA® instruments

Bleach Test Kit

The HI3843 is a titration-based chemical test kit that determines the hypochlorite concentration within the 50 to 150 g/L Cl_2 range.

- Complete setup
  - All required materials are included with the test kit, such as the Erlenmeyer flask, indicator and reagent bottles and packets, and plastic pipettes.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3843-100 can be ordered to replace the reagents supplied with the kit.

Specifications	HI3843 Hypochlorite (as Cl_2)
Type	titration
Range	50-150 g/L (ppt)
Smallest Increment	5 g/L (ppt)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	**HI3843** test kit comes with 30 mL potassium iodide solution, 100 packets bleach reagent B, 60 mL bleach reagent C (2), 125 mL glass Erlenmeyer flask and 1 mL plastic pipettes (25).
Reagent	**HI3843-100** hypochlorite (bleach), 100 tests avg.

Hydrogen Peroxide Test Kit

The HI3844 is a titration-based chemical test kit that determines the hydrogen peroxide concentration in two ranges.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles, spoon, and plastic pipettes.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3844-100 can be ordered to replace the reagents supplied with the kit.

Specifications	HI3844 Hydrogen Peroxide (as H_2O_2)
Type	titration
Range	0.00-2.00 mg/L (ppm) 0.0-10.0 mg/L (ppm)
Smallest Increment	0.25 mg/L (ppm) 1.0 mg/L (ppm)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	**HI3844** test kit comes with 100 mL hydrogen peroxide reagent A, 17 g hydrogen peroxide reagent B, 30 mL hydrogen peroxide reagent C, 25 mL hydrogen peroxide reagent D, graduated plastic test tube with cap, 50 mL calibrated plastic vessel, 3 mL plastic pipette, 1 mL plastic pipette and plastic spoon.
Reagent	**HI3844-100** hydrogen peroxide, 100 tests avg.

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Ozone Test Kit

The HI38054 is a chemical test kit that determines the ozone concentration in samples withing the 0.0 to 2.3 mg/L range. The HI38054 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 100 tests.

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

- High resolution
  - Readings from 0.0 to 2.3 mg/L are determined to 0.1 mg/L resolution.

- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38054-100 can be ordered to replace the reagents supplied with the kit.

⊔ Parameter Highlight

Ozone

Ozone is an oxidizing agent used in many industrial and consumer applications. In drinking water, ozone is used for manganese removal, forming a precipitate that can be filtered out in the purification process. Additional organic matter present in drinking water that is responsible for producing odor and color can also be removed by ozone. Ozone also acts as a germicide and is used to manufacture pharmaceuticals, as a deodorizer, and bleaching agent.

Specifications	HI38054 Ozone
Type	checker disc
Range	0.0-2.3 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	DPD
Number of Tests	100 avg.
Ordering Information	**HI38054** test kit comes with 100 packets ozone reagent, 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI38054-100** ozone, 100 tests avg.

Phosphate Test Kit
with Color Cube

The HI3833 is a colorimetric chemical test kit that determines the phosphate concentration in samples within a 0 to 5 mg/L (ppm) range. The HI3833 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

Specifications	HI3833 Phosphate (as PO_4^{3-})
Type	colorimetric
Range	0-5 mg/L (ppm)
Smallest Increment	1 mg/L (ppm)
Method	ascorbic acid
Number of Tests	50 avg.
Ordering Information	**HI3833** test kit comes with 20 mL plastic beaker, color comparison cube and 50 packets phosphate reagent.
Reagent	**HI3833-050** phosphate, 50 tests avg.

Sulfite Test Kit

The HI3822 is a chemical test kit that determines the sulfite concentration in two ranges: 0 to 20 mg/L and 0 to 200 mg/L Na_2SO_3. The HI3822 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

Specifications	HI3822 Sulfite (as Na_2SO_3)
Type	titration
Range	0.0-20.0 mg/L (ppm); 0-200 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm); 2 mg/L (ppm)
Method	iodometric
Number of Tests	110 avg.
Ordering Information	**HI3822** test kit comes with 30 mL sulfamic acid solution, 30 mL EDTA reagent, 15 mL sulfuric acid solution, 10 mL starch indicator, 120 mL titrant solution, 20 mL calibrated vessel, 50 mL calibrated vessel and calibrated syringe with tip.
Reagent	**HI3822-100** sulfite (as Na_2SO_3), 110 tests avg.

Multiparameter Photometers

with Digital pH Electrode Input

HI83300 is a compact, multiparameter photometer for use in the lab or in the field. The meter is one of the most advanced photometers available with an innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette. This meter has 60 different programmed methods measuring 37 key water quality parameters and also offers an absorbance measurement mode for performance verification and for users that would like to develop their own concentration versus absorbance curves.

Analytical Testing for the Food Industry

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
- Built-in Reaction Timer for Photometric Measurements
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements.
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector.
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry.
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading.
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button.

- Cuvette Cover
  - Aids in preventing stray light from affecting measurements.
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button.
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad.
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive or computer via USB.
  - Data can be exported as a .CSV file.
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement.
- Battery Status Indicator
  - Indicates the amount of battery life left.
- Error Messages
  - Photometric error messages.
  - pH calibration messages include clean electrode, check buffer and check probe.

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Parameter	Range
Alkalinity	0 to 500 mg/L (as $CaCO_3$)
Alkalinity, Marine	0 to 300 mg/L (as $CaCO_3$)
Aluminum	0.00 to 1.00 mg/L (as $Al3+$)
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)
Bromine	0.00 to 8.00 mg/L (as Br_2)
Calcium	0 to 400 mg/L (as Ca^{2+})
Calcium, Marine	200 to 600 mg/L (as Ca^{2+})
Chloride	0.0 to 20.0 mg/L (as Cl^-)
Chlorine Dioxide	0.00 to 2.00 mg/L (as ClO_2)
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)
Chlorine, Free Ultra Low Range	0.000 to 0.500 mg/L (as Cl_2)
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)
Chlorine, Total Ultra Low Range	0.000 to 0.500 mg/L (as Cl_2)
Chlorine, Total Ultra High Range	0 to 500 mg/L (as Cl_2)
Chromium(VI) Low Range	0 to 300 µg/L (as Cr^{6+})
Chromium(VI) High Range	0 to 1000 µg/L (as Cr^{6+})
Color of Water	0 to 500 PCU (Platinum Cobalt Units)
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})
Cyanuric Acid	0 to 80 mg/L (as CYA)
Fluoride Low Range	0.00 to 2.00 mg/L (as F^-)
Fluoride High Range	0.0 to 20.0 mg/L (as F^-)
Hardness, Calcium	0.00 to 2.70 mg/L (as $CaCO_3$)
Hardness, Magnesium	0.00 to 2.00 mg/L (ppm) (as $CaCO_3$)
Hardness, Total Low Range	0 to 250 mg/L (as $CaCO_3$)
Hardness, Total Medium Range	200 to 500 mg/L (as $CaCO_3$)
Hardness, Total High Range	400 to 750 mg/L (as $CaCO_3$)

Parameter	Range
Hydrazine	0 to 400 µg/L (as N_2H_4)
Iodine	0.0 to 12.5 mg/L (as I_2)
Iron Low Range	0.000 to 1.600 mg/L (as Fe)
Iron High Range	0.00 to 5.00 mg/L (as Fe)
Magnesium	0 to 150 mg/L (as Mg^{2+})
Manganese Low Range	0 to 300 µg/L (as Mn)
Manganese High Range	0.0 to 20.0 mg/L (as Mn)
Molybdenum	0.0 to 40.0 mg/L (as Mo^{6+})
Nickel Low Range	0.000 to 1.000 mg/L (as Ni)
Nickel High Range	0.00 to 7.00 g/L (as Ni)
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)
Nitrite Ultra Low Range, Marine	0 to 200 µg/L (as NO_2^-- N)
Nitrite Low Range	0 to 600 µg/L (as NO_2^-- N)
Nitrite High Range	0 to 150 mg/L (as NO_2^-- N)
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)
Oxygen Scavengers	0.00 to 1.50 mg/L (as Carbohydrazide)
Oxygen Scavengers	0 to 1000 µg/L (as DEHA)
Oxygen Scavengers	0.00 to 2.50 mg/L (as Hydroquinone)
Oxygen Scavengers	0.00 to 4.50 mg/L (as Iso-ascorbic acid)
Ozone	0.00 to 2.00 mg/L (as O_3)
pH	6.5 to 8.5 pH
Phosphate Ultra Low Range, Marine	0 to 200 µg/L (as P)
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})
Potassium	0.0 to 20.0 mg/L (as K)
Silica Low Range	0.00 to 2.00 mg/L (as SiO_2)
Silica High range	0 to 200 mg/L (as SiO_2)
Silver	0.000 to 1.000 mg/L (as Ag)
Sulfate	0 to 150 mg/L (as SO_4^{2-})
Surfactants, Anionic	0.00 to 3.50 mg/L (as SDBS)
Zinc	0.00 to 3.00 mg/L (as Zn)

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Analytical Testing for the Food Industry

* Limits will be reduced to actual sensor limits

Specifications

Measurement Channels	5 x optical channels; 1 x digital electrode channel (pH measurement)	
Absorbance	Range	0.000 to 4.000 Abs
	Resolution	0.001 Abs
	Accuracy	±0.003 Abs (at 1.000 Abs)
	Light Source	light-emitting diode
	Bandpass Filter Bandwidth	8 nm
	Bandpass Filter Wavelength Accuracy	± 1.0 nm
	Light Detector	silicon photocell
	Cuvette Type	round, 24.6 mm diameter and 16 mm diameter
	Number of Methods	128 max
pH (from pH digital electrode)	Range	-2.00 to 16.00 pH (±1000 mV)*
	Resolution	0.01 pH (0.1 mV)
	Temperature Compensation	Automatic (-5.0 to 100.0°C; 23.0 to 212.0°F)*
Temperature	Range	-20 to 120°C (-4.0 to 248.0 °F)
	Resolution	0.1 °C (0.1 °F)
Ordering Information	**HI83300-01** (115V) and **HI83300-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.	
Accessories	**HI83300-11** CAL Check Cuvette Kit for HI83300	
	HI11310 digital combination pH electrode	
	HI181F-1 Blue mini-stirrer and electrode holder in one (115V)	
	HI76404A Blue electrode holder (attaches to HI83325)	
	HI180F-1 Blue mini-stirrer (115V)	

HI11310 digital combination pH electrode

HI181F-1 Blue mini-stirrer and electrode holder (115V)

HI83300-11 CAL Check Cuvette Kit for HI83300

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Peroxide Value

Over time, edible oils may degrade and spoil. The primary cause of edible oil degradation is oxidation; as oil oxidation occurs, flavors and odors can change, resulting in a product that is undesirable to consumers. The unsaturated fatty acids found in oils react with oxygen, creating peroxide as an unwanted byproduct. This oxidation reaction is more likely to occur under certain conditions, including exposure to light, the presence of metal ions, the introduction of oxygen, or when storage temperatures are not maintained. In order to determine oil quality and the onset of oxidation, peroxide value is determined. Peroxide value is defined as the amount of peroxide oxygen per kilogram of oil, which is reported in units of milliequivalents or meq. A lower peroxide value indicates higher quality edible oil.

Oil Peroxides Content	
<10 meq O_2/kg	excellent conservation
10-15 meq O_2/kg	good conservation
<10 meqO_2/kg	refined oil
>20 meqO_2/kg	rancid oil

Photometer for the Determination of Peroxide Value in Olive Oils

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- Zero key
  - A simple press of the zero key on the face of the meter will account for the color and imperfections in the oil sample before reagent addition.

- GLP
  - Review of the last calibration date.

- Auto shut-off

- Battery status indicator

- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.

- Units of measure
  - Appropriate unit of measure is displayed along with reading.

HI83730-20

Specifications	HI83730
Range	0.0 to 25.0 meq O_2/kg
Resolution	0.5 meq O_2/kg
Accuracy @ 25°C/77°F	±0.5 meq O_2/kg
Light Source	tungsten lamp
Light Detector	silicon photocell with narrow band interference filter @ 466 nm
Method	adaptation of EC 2568/91 method and following amendments
Ordering Information	**HI83730-01** (115V) and **HI83730-02** (230V) are supplied with reagents for 10 tests, 1 mL syringes (4), scissors, vial wiping cloth, batteries, AC adapter, instructions and a rigid carrying case.
Reagent Sets	**HI83730-20** peroxide in olive oil reagents kit (21 manual tests)

HANNA instruments

Parameter Highlight

Maple Syrup Quality

When selecting a maple syrup, it is important to consider its clarity along with color and taste. A light, clear syrup has a high level of quality, indicative of a very pure product, whereas a dark, cloudy syrup is less desirable, owing to the presence of impurities and suspended solids. In Canada and the United States, maple syrup is classified into different standards based on color and clarity. Lighter, clearer syrups are produced earlier in the season, while, darker syrups are produced later in the season. The lightest grade, produced earliest in the season and characterized by its very pale color, has a light transmittance of over 75%. The darkest grade, produced latest in the season, has a light transmittance of less than 25% (27%, non-IMSI standards).

The grade of maple syrup can be determined by using color comparators or by measuring how much light is transmitted through the syrup. Hanna provides the HI96759 handheld maple syrup transmittance analyzer, which compares the percentage of light that passes through the sample to that of a glycerol reagent. With its advanced optical system, the highly precise meter eliminates subjectivity to provide readings that are accurate and repeatable.

Analytical Testing for the Food Industry

Maple Syrup Portable Photometer

The HI96759 is a handheld maple syrup transmittance analyzer that has a tungsten lamp with a narrow band interference filter to isolate the 560 nm wavelength. This photometer uses 10 mm disposable sample cuvettes and is calibrated to 100% transmittance with a glycerol standard. All samples are compared to the glycerol standard and readings are displayed as % transmittance. With its advanced optical system, the highly precise meter eliminates subjectivity to provide readings that are accurate and repeatable.

- Calibrates 100% transmittance with glycerol reference standard
- Uses 560 nm wavelength
- Disposable 10 mm square cuvettes
- Ideal for new Vermont (IMSI) standards
- Conforms to USDA specifications
- GLP – Review of the last calibration date

State of Vermont Grades and Standards
(New IMSI* standards)

Grade A Color Classes	Taste	Light Transmittance
Grade A Golden	Delicate	≥ 75.0
Grade A Amber	Rich	50.0 to 74.9
Grade A Dark	Robust	25.0 to 49.9
Grade A Very Dark	Strong	< 25.0

* International Maple Syrup Institute

Specifications	HI96759	
Range	0.0 to 100.0% transmittance	
Resolution	0.1% transmittance	
Accuracy @ 25°C (77°F)	±3% @ 75.0% transmittance	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter 560 nm	
Method	direct measure	
Ordering Information	**HI96759** are supplied with square sample cuvettes (6), light shield cap, 5 mL syringes (2), 30 mL bottle of glycerol, cuvette wiping cloth, 9V battery, instrument quality certificate, instruction manual and rigid carrying case.	
Solutions and Accessories	**HI93703-57**	glycerol, (4) 30 mL
	HI93703-50	cuvette cleaning solution, 230 mL
	HI93703-56	consists of 82 matched square cuvettes, glycerol standard (30 mL) and 5 mL syringes (2) (75 tests average)

HANNA® instruments

Parameter Highlight

Honey Color

The primary characteristic for commercial honey classification is color. Color classes are expressed in millimeters (mm) Pfund as compared to an analytical grade glycerol standard reference.

The natural color of honey presents many tonalities: from straw yellow to amber, from dark amber to almost black with a hint of red. The color of untreated honey originates from the botanical varieties used by the bees; for this reason, its coloration allows one to commercially identify the original floral type.

The color of honey tends to darken with age or change according to the method of conservation or production used by beekeepers. These practices can include the use of old beehives, contact with metals, the temperature of conservation, and exposure to light.

The HI96785 uses direct measurement to determine honey coloration ranging from 0 to 150 mm Pfund. This photometer has a tungsten lamp with a narrow band interference filter to isolate the 420 nm and 525 nm wavelength. All samples are measured in a square cuvette having a 10 mm light path and are compared to a glycerol standard. The percent light transmittance readings are directly displayed as mm Pfund. With its advanced optical system, the highly precise meter eliminates subjectivity to provide readings that are accurate and repeatable.

HANNA
instruments

Honey Color Portable Analyzer

The HI96785 portable analyzer is for the determination of honey color. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path 10 mm path length.
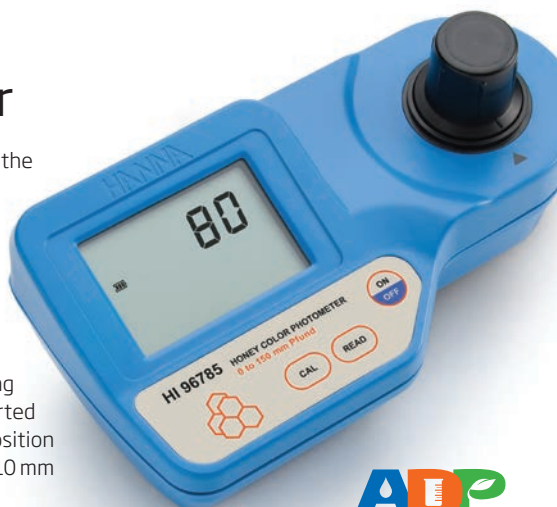
USDA Color Standards Designations	Color Range Pfund Scales (mm)
Water White	8 or less
Extra White	Over 8 to and including 17
White	Over 17 to and including 34
Extra Light Amber	Over 34 to and including 50
Light Amber	Over 50 to and including 85
Amber	Over 85 to and including 114
Dark Amber	Over 114

Specifications	HI96785
Range	0 to 150 mm Pfund
Resolution	1 mm Pfund
Accuracy @ 25°C (77°F)	±2 mm Pfund @ 80mm Pfund
Light Source	tungsten lamps
Light Detector	silicon photocells with narrow band interference filter @ 420 nm and 525 nm
Method	direct measure
Ordering Information	**HI96785** is supplied with sample cuvettes (5), 9V battery, light shield cap, cuvette wiping cloth, rigid carrying case, instrument quality certificate and instruction manual.
Accessories	**HI93703-57** glycerol, (4) 30 mL
	HI93703-56 consists of 90 matched square cuvettes, 30 mL of glycerol and (2) 5 mL syringes (75 tests average)
	HI70662 cleaning solution for honey meter (30 mL)

Chlorine, Low Range Total Portable Photometer

- CAL Check™
  - Allows for meter performance verification and calibration using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.
- Auto-shut off
- Battery status indicator

- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.

Specifications	HI96761
Range	0.000 to 0.500 mg/L (ppm)
Resolution	0.001 mg/L
Accuracy @ 25°C (77°F)	±0.020 mg/L ±3% of reading
Light Source	tungsten lamp
Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Method	adaptation of the USEPA method 330.5
Ordering Information	**HI96761** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96761C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately
Reagents and Standards	**HI96761-11** CAL Check Standard cuvettes
	HI95761-01 reagents for 100 tests
	HI95761-03 reagents for 300 tests

HANNA® **instruments**

Analytical Testing for the Food Industry

Free and Total Chlorine Portable Photometer

- Advanced LED optical system
  - LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.
- Waterproof and floating IP67 case
- CAL Check™
- GLP
- Auto logging (50 readings)
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- On-screen tutorial mode with animations
- Auto-shut off
- Battery status indicator
- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.

Specifications		HI97711
Measurement	Range (all methods)	0.00 to 5.00 mg/L (as Cl_2)
	Resolution (all methods)	0.01 mg/L
	Accuracy @25°C (77°F) (all methods)	±0.03 mg/L ±3% of reading at 25 °C
	Method	Adaptation of the EPA DPD method 330.5
Measurement System	Light Source	light emitting diode
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Ordering Information	**HI97711** is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI97711C** includes photometer, CAL Check standards, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI97701-11** CAL Check standard cuvettes for free and total chlorine	
	HI93701-01 free chlorine powder reagent (100 tests)	
	HI93701-03 free chlorine powder reagent (300 tests)	
	HI93701-F free chlorine liquid reagent (300 tests)	
	HI93711-01 total chlorine powder reagent (100 tests)	
	HI93711-03 total chlorine powder reagent (300 tests)	
	HI93701-T total chlorine liquid reagent (300 tests)	

HANNA® instruments

Free Chlorine Portable Photometer

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

- Waterproof and floating IP67 case

- CAL Check™

- GLP

- Auto logging (50 readings)

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- On-screen tutorial mode with animations

- Auto-shut off

- Battery status indicator

- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.

Specifications		HI97701
Measurement	Range (all methods)	0.00 to 5.00 mg/L (as Cl_2)
	Resolution (all methods)	0.01 mg/L
	Accuracy @25°C (77°F) (all methods)	±0.03 mg/L ±3% of reading at 25 °C
	Method	adaptation of the EPA DPD method 330.5
Measurement System	Light Source	light emitting diode
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Ordering Information	**HI97701** is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately. **HI97701C** includes photometer, CAL Check standards, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI97701-11** CAL Check standard cuvettes for free and total chlorine	
	HI93701-01 free chlorine powder reagent (100 tests)	
	HI93701-03 free chlorine powder reagent (300 tests)	
	HI93701-F free chlorine liquid reagent (300 tests)	

Free Chlorine and Total Chlorine UHR Portable Photometer

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

- Waterproof and floating IP67 case

- CAL Check™

- GLP

- Auto logging (50 readings)

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- On-screen tutorial mode with animations

- Auto-shut off

- Battery status indicator

- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.

Specifications		HI97771
Free Chlorine (powder and liquid)	Range	0.00 to 5.00 mg/L (as Cl_2)
	Resolution	0.01 mg/L
	Accuracy @25°C (77°F)	±0.03 mg/L ±3% of reading at 25°C
	Method	Adaptation of the EPA DPD method 330.5
Total Chlorine Ultra High Range	Range	0 to 500 mg/L (as Cl_2)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±3 mg/L ±3% of reading at 25 °C
	Method	adaptation of the Standard Methods for Examination of Water and Wastewater, 20th edition, 4500-Cl.
Measurement System	Light Source	light emitting diode
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Ordering Information	**HI97771** is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.	
	CAL Check standards and testing reagents sold separately	
	HI97771C includes photometer, CAL Check cuvette A, CAL Check cuvette B for free chlorine (powder and liquid), CAL Check cuvette B for total chlorine UHR, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case.	
	Reagents sold separately	
Reagents and Standards	**HI97701-11** CAL Check standard cuvettes for free and total chlorine	
	HI93701-01 free chlorine powder reagent (100 tests)	
	HI93701-03 free chlorine powder reagent (300 tests)	
	HI93701-F free chlorine liquid reagent (300 tests)	
	HI97771-11 CAL Check standard cuvettes for total chlorine UHR	
	HI95711-01 total chlorine UHR reagent (100 tests)	
	HI95711-03 total chlorine UHR reagent (300 tests)	

Chloride Portable Photometer

- **CAL Check™**
  - Allows for meter performance verification and calibration using NIST traceable standards.
- **GLP**
  - Review of the last calibration date.
- **Built-in timer**
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- **Error messages**
  - Messages on display includes: no cap, high zero, and standard too low.

- **Auto-shut off**
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode.
- **Battery status indicator**

Specifications	HI96753
Range	0.0 to 20.0 mg/L (ppm)
Resolution	0.1 mg/L
Accuracy @ 25°C (77°F)	±0.5 mg/L ±6% of reading
Light Source	light emitting diode
Light Detector	silicon photocell with narrow band interference filter @ 466 nm
Method	adaptation of the mercury (II) thiocyanate method
Ordering Information	**HI96753** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check™ standards and testing reagents sold separately **HI96753C** includes photometer, CAL Check™ standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately
Reagents and Standards	**HI96753-11** CAL Check™ standard cuvettes
	HI93753-01 reagents for 100 tests
	HI93753-03 reagents for 300 tests

Total Hardness Portable Photometer

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

- Waterproof and floating IP67 case

- CAL Check™

- GLP

- Auto logging (50 readings)

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- On-screen tutorial mode with animations

- Auto-shut off

- Battery status indicator

- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.

Specifications		HI97735
Total Hardness LR	Range	0 to 250 mg/L (as CaCO$_3$)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±5 mg/L ±4% of reading at 25°C
	Method	Adaptation of the EPA recommended method 130.1
Total Hardness MR	Range	200 to 500 mg/L (as CaCO$_3$)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±7 mg/L ±3% of reading at 25°C
	Method	Adaptation of the EPA recommended method 130.1
Total Hardness HR	Range	400 to 750 mg/L (as CaCO$_3$)
	Resolution	1 mg/L
	Accuracy @25°C (77°F)	±10 mg/L ±2% of reading at 25°C
	Method	Adaptation of the EPA recommended method 130.1
Measurement System	Light Source	light emitting diode
	Light Detector	silicon photocell with narrow band interference filter @ 466 nm
Ordering Information	**HI97735** is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.	
	CAL Check standards and testing reagents sold separately	
	HI97735C includes photometer, CAL Check cuvette A, CAL Check cuvette B for total hardness LR, MR and HR, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101414 rigid carrying case.	
	Reagents sold separately	
Reagents and Standards	**HI97735-11** CAL Check standard cuvettes for total hardness LR, MR, HR	
	HI93735-00 hardness LR reagent (100 tests)	
	HI93735-01 hardness MR reagent (100 tests)	
	HI93735-02 hardness HR reagent (100 tests)	
	HI93735-0 reagents for 300 tests (LR - 100tests, MR - 100 tests, HR - 100 tests)	

HANNA® instruments

Iodine Portable Photometer

- CAL Check™
- GLP
- Built-in timer
- Error messages
- Auto-shut off
- Battery status indicator
- Cooling lamp indicator

Iodine

The disinfectant properties of iodine have led to its use as an alternative to chlorine and bromine. Unlike chlorinated pools, water treated with iodine decreases eye irritation among swimmers and provides a level of disinfection more stable to adverse conditions. However, its toxic and corrosive properties, along with the difficulties of dissolving it in water, have limited its widespread acceptance. One of the most common applications of iodine is in poultry industry process water.

Specifications	HI96718
Range	0.0 to 12.5 mg/L (ppm)
Resolution	0.1 mg/L
Accuracy @ 25°C (77°F)	±0.1 mg/L ±5% of reading
Light Source	tungsten lamp
Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method
Ordering Information	**HI96718** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96718C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately
Reagents and Standards	**HI96718-11** CAL Check standard cuvettes
	HI93718-01 reagents for 100 tests
	HI93718-03 reagents for 300 tests

HANNA® instruments   Analytical Testing for the Food Industry

Phosphate, Low Range Portable Photometer

- Advanced LED optical system
  - LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability.
- Waterproof and floating IP67 case
- CAL Check™
- GLP
- Auto logging (50 readings)
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.

- On-screen tutorial mode with animations
- Auto-shut off
- Battery status indicator
- Error messages
  - Messages on display includes: no cap, high zero, and standard too low.

Specifications		HI97713
Measurement	Range	0.00 to 2.50 mg/L (as PO_4^{3-})
	Resolution	0.01 mg/L
	Accuracy @25°C (77°F)	±0.04 mg/L ±4% of reading at 25°C
	Method	Adaptation of the Ascorbic Acid method
Measurement System	Light Source	light emitting diode
	Light Detector	silicon photocell with narrow band interference filter @ 610 nm
Ordering Information		**HI97713** is supplied with sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), instrument quality certificate and instruction manual.
		CAL Check standards and testing reagents sold separately
		HI97713C includes photometer, CAL Check cuvette A, CAL Check cuvette B for Phosphate LR, sample cuvettes (2), sample caps (2), plastic stoppers (2), 1.5V AA batteries (3), cuvette wiping cloth, scissors, instrument quality certificate, instruction manual and HI7101412 rigid carrying case.
		Reagents sold separately
Reagents and Standards		**HI97713-11** CAL Check standard cuvettes for phosphate LR
		HI93713-01 phosphate HR reagent (100 tests)
		HI93713-03 phosphate HR reagent (300 tests)

HANNA® instruments

⭐ Application Highlight

Disinfection

Removal of microbial contamination is essential in food production. In order to ensure the area and materials that come in contact with food are properly sanitized, surfaces are first cleaned and then disinfected. Cleaning removes most of the microbial contamination, but it is the act of disinfection that further reduces the surface population of microorganisms that can contaminate machinery and food products. The food industry limits the types of disinfectants that can be utilized based upon toxicity. If conditions allow, high temperature water, or steam, is the disinfectant of choice due to its non-corrosive, non-selective and non-residual nature. However, with open surfaces, high temperature-based disinfection is not always feasible, in which case chlorine releasing compounds, ozone and surfactants are most often used.

Disinfectant efficiency is affected by a variety of factors, such as interfering substances, pH, concentration and contact time. Certain disinfectants, such as chlorine-releasing compounds (i.e. sodium hypochlorite, or "bleach") are highly pH dependent and therefore require pH to be monitored during the disinfection process. Ideally for chlorine disinfection, the pH should be between 6.5 and 7.0 to ensure the disinfectant is sufficiently sanitizing. In cases where the disinfectant is an oxidizer, such as ozone and chlorine, oxidation-reduction potential (ORP) is monitored to determine the oxidizing potential of the solution; the mV reading produced during the measurement will increase as the oxidizing potential increases. By using ORP values in conjunction with disinfectant concentration, the operator can ensure that the compound is in an effective form and is in large enough concentrations.

Various methods for measuring the disinfectant concentration are available including colorimetric tests for chlorine (free and total), ozone (low levels), anionic surfactants, iodine, and bromine.

Chloride Handheld Colorimeter

Specifications	HI753
Range	0.0 to 20.0 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	± 0.5 ppm ± 6% of reading
Light Source	LED @ 470 nm
Light Detector	silicon photocell
Method	adaptation of the mercury(II) thiocyanate method
Ordering Information	**HI753** Checker®HC is supplied with sample cuvettes with caps (2), chloride reagent starter kit (reagents for 25 tests), syringes with tips (2), 1.5V AAA battery, instructions and quick start guide.
Reagent Set	**HI753-25** (25 tests)
Calibration Set	**HI753-11**

HANNA®
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Analytical Testing for the Food Industry

Chlorine Handheld Colorimeters

- Use for quick and accurate on-the-spot analysis
- One-button operation makes getting your chlorine results simple.
- Easy operation and direct results make measurement quick.
- Operated by a single AAA battery

Specifications	HI701 (Free Chlorine)	HI711 (Total Chlorine)	HI771 (UHR Chlorine)	HI761 (ULR Chlorine)
Range	0.00 to 2.50 ppm	0.00 to 3.50 ppm	0 to 500 ppm	0 to 500 ppb
Resolution	0.01 ppm	0.01 ppm	1 ppm	1 ppb
Accuracy @ 25°C/77°F	±0.03 ppm ±3% of reading	±0.03 ppm ±3% of reading	±3 ppm ±5% of reading	±5 ppb ±5% of reading
Light Source	LED @ 525 nm	LED @ 525 nm	LED @ 525 nm	LED @ 525 nm
Light Detector	silicon photocell	silicon photocell	silicon photocell	silicon photocell
Method	adaptation of USEPA method 330.5, DPD method	adaptation of USEPA method 330.5, DPD method	adaptation of the Standard Methods for Water and Wastewater, 20th Edition 4500-Cl	adaptation of USEPA method 330.5, DPD method
Ordering Information	**HI701** Checker HC is supplied with sample cuvettes with caps (2), free chlorine reagent starter kit (reagents for 6 tests), 1.5V AAA battery, instructions and quick start guide.	**HI711** Checker HC is supplied with sample cuvettes with caps (2), total chlorine reagent starter kit (reagents for 6 tests), 1.5V AAA battery, instructions and quick start guide.	**HI771** Checker®HC is supplied with sample cuvettes with caps (2), Chlorine UHR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.	**HI761** Checker®HC is supplied with sample cuvettes with caps (2), total chlorine ULR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI701-25** (25 tests)	**HI711-25** (25 tests)	**HI771-25** (25 tests)	**HI761-25** (25 tests)
Calibration Set	**HI701-11**	**HI711-11**	**HI771-11**	**HI761-11**

HANNA® instruments

Maple Syrup Digital Grader

Handheld Colorimeter

The HI759 Maple Syrup Digital Grader is a handheld colorimeter designed for quick, accurate determination of maple syrup. The HI759 is designed as a more accurate alternative to temporary and permanent visual grading kits, providing quick, accurate results in four easy steps.

This Maple Syrup Digital Grader measures the percent light transmittance of the syrup and directly displays the percentage results on the large, easy to read LCD display. Located on the back of the meter is a chart referencing the percent light transmittance to the grade. Eliminating the subjectivity of grading by eye and the potential for mislabeling, the HI759 is grading made simple.

State of Vermont Grades and Standards
(New IMSI* standards)

Grade A Color Classes	Taste	Light Transmittance
Grade A Golden	Delicate	≥ 75
Grade A Amber	Rich	50 to 74
Grade A Dark	Robust	25 to 49
Grade A Very Dark	Strong	< 25

Specifications	HI759
Range	0 to 100% transmittance
Resolution	1% transmittance
Accuracy	±4% transmittance
Light Source	light emitting diode @ 560 nm
Light Detector	silicon photocell
Ordering Information	**HI759** Checker®HC is supplied with sample cuvettes with caps (3), glycerol standard cuvette, plastic beakers (3), battery, instructions and quick reference guide.
Accessories	**HI759-11** glycerol reference cuvettes (2 pcs)
	HI731359 round glass cuvettes with plastic inserts (25)

 Parameter Highlight

Maple Syrup Season

The season of maple syrup production spans several months between winter and spring each year. As the days get longer and warmer and the nights stay below freezing, the sap from maple trees begins to flow and tapping begins. At the beginning of production season, the sap produces a lighter, sweeter syrup comprised of sucrose as the main sugar content. As the season progresses and temperatures rise, microorganisms grow and colonize the sap as it is collected. These bacteria, while not harmful, convert part of the sucrose present into invert sugars, glucose and fructose. The level of invert sugars in the sap, as well as the chemical processes that occur during boiling, are responsible for creating a darker and stronger flavored syrup product.

Maple syrup grading standards for the United States and Canada allow consumers to easily distinguish between the different grades of syrup, regardless of the place of origin.

* International Maple Syrup Institute

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Analytical Testing for the Food Industry

Iodine Handheld Colorimeter

Specifications	HI718
Range	0.0 to 12.5 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	±0.1 ppm ±5% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method
Ordering Information	**HI718** Checker®HC is supplied with sample cuvettes with caps (2), iodine reagent starter kit (reagents for 6 tests), 1.5V AAA battery, instructions and quick start guide.
Reagent Set	**HI718-25** (25 tests)
Calibration Set	**HI718-11**

- Use for quick and accurate on-the-spot analysis
- One-button operation makes getting your chlorine results simple.
- Operated by a single AAA battery

Phosphate, Low Range Handheld Colorimeter

Specifications	HI713 (LR)
Range	0.00 to 2.50 ppm
Resolution	0.01 ppm
Accuracy @ 25°C/77°F	±0.04 ppm ±4% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Method	adaptation of the Ascorbic Acid method
Ordering Information	**HI713** Checker®HC is supplied with sample cuvettes with caps (2), phosphate LR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI713-25** (25 tests)
Calibration Set	**HI713-11**

- Use for quick and accurate on-the-spot analysis
- One-button operation makes getting your chlorine results simple.
- Operated by a single AAA battery

HANNA®instruments

- Cuvette Adapter
  - The HI83399 is supplied with a 16 mm cuvette adapter that accepts digestion vials.

d DIGITAL — HI83399 is compatible with Hanna pH digital probes.

Multiparameter Photometer with COD

with Digital pH Electrode Input

HI83399 is a compact, multiparameter photometer with COD for measuring key parameters. With the digital pH/temperature electrode input, this meters doubles as a professional pH meter. Now one meter can be used for both photometric and pH measurements.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.

- Built-in reaction timer for photometric measurements
  - The measurement is taken after the countdown timer expires. This ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements.

- Result conversion
  - Automatically convert readings to other chemical forms with the touch of a button.

HANNA® instruments

- Absorbance mode
  - Hanna's exclusive CAL Check cuvettes for validation of light source and detector.
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry.
- Digital pH electrode input
  - Measure pH and temperature with a single probe.
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability.
  - pH CAL Check alerts user to potential problems during the calibration process.

- Data logging
  - Log and recall up to 1000 photometric and pH readings via dedicated LOG and RECALL buttons.
  - Sample ID and User ID information can be added to a logged reading.
- Connectivity
  - Logged readings can be transferred to a flash drive via USB or to a computer via micro-USB.
  - Data is exported as a .CSV file for use.
- Rechargeable battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement.
- Battery status indicator
- Backlit 128 x 64 pixel graphic LCD display

Parameter Highlight

Chemical Oxygen Demand

Chemical Oxygen Demand (COD) is an important parameter measured in food processing wastewater. COD is measurement of the amount of oxygen necessary for chemical oxidation of organic compounds to occur. While COD measurements are typically used to indicate the strength and quality of the wastewater produced during the food manufacturing process, it can also indicate waste in manufacturing procedures.

The major constituents of food waste have a nutrient value, which contribute to high COD readings. Elevated levels of COD can result in organic overloading if wastewater from food processes is left untreated before discharged into a public sewer system. The National Pretreatment Program was established to regulate pollutant overloads within the sewer collection system and municipal wastewater treatment plants. Food processing plants that must comply with a pretreatment program are required to remove pollutants, including COD, from their wastewater prior to discharge.

Analysis of COD involves the use of a strong oxidizing agent, typically potassium dichromate. Hanna COD reagents are supplied as individual vials with pre-measured reagents to which the wastewater sample is added, eliminating the need for chemical handling and reagent additions. A 2 hour digestion is necessary for the oxidation to completely occur; after cooling, a photometer can be used to colorimetrically determine the COD value. Hanna offers a variety of COD reagents, including EPA-approved, which contains mercuric sulfate and needs to be safely disposed of. Hanna also offers ISO-approved and mercury-free reagents.

HANNA® instruments

General Specifications

Parameters	See table below	
Measurement Channels	5 x optical channels; 1 x digital electrode channel (pH measurement)	
Absorbance	Range	0.000 to 4.000 Abs
	Resolution	0.001 Abs
	Accuracy	±0.003 Abs (at 1.000 Abs)
	Light Source	light-emitting diode
	Bandpass Filter Bandwidth	8 nm
	Bandpass Filter Wavelength Accuracy	± 1.0 nm
pH (from pH digital electrode)	Range	-2.00 to 16.00 pH (±1000 mV)*
	Resolution	0.01 pH (0.1 mV)
	Temperature Compensation	Automatic (-5.0 to 100.0°C; 23.0 to 212.0°F)*
Temperature	Range	-20 to 120°C (-4.0 to 248.0 °F)
	Resolution	0.1 °C (0.1 °F)
Ordering Information	**HI83399-01** (115V) and **HI83399-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter and instruction manual. Reagents sold separately.	
Standards	**HI83399-11** CAL Check Cuvette Kit for HI83399	

Parameters

Alkalinity	Copper High Range	Nitrogen, Total High Range (16 mm vial)
Alkalinity, Marine	Cyanuric Acid	Oxygen, Dissolved
Aluminum	Fluoride Low Range	Oxygen Scavengers (Carbohydrazide)
Ammonia Low Range	Fluoride High Range	Oxygen Scavengers (DEHA)
Ammonia Low Range (16 mm vial)	Hardness, Calcium	Oxygen Scavengers (Hydroquinone)
Ammonia Medium Range	Hardness, Magnesium	Oxygen Scavengers (Iso-ascorbic acid)
Ammonia High Range	Hardness, Total Low Range	Ozone
Ammonia High Range (16 mm vial)	Hardness, Total Medium Range	pH (from method)
Bromine	Hardness, Total High Range	Phosphate Ultra Low Range, Marine
Calcium	Hydrazine	Phosphate Low Range
Calcium, Marine	Iodine	Phosphate High Range
Chloride	Iron Low Range	Phosphorus Reactive Low Range (16 mm vial)
Chlorine Dioxide	Iron High Range	Phosphorus Reactive High Range (16 mm vial)
Chlorine, Free	Magnesium	Phosphorus Acid Hydrolyzable (16 mm vial)
Chlorine, Free Ultra Low Range	Manganese Low Range	Phosphorus, Total Low Range (16 mm vial)
Chlorine, Total	Manganese High Range	Phosphorus, Total High Range (16 mm vial)
Chlorine, Total Ultra Low Range	Molybdenum	Potassium
Chlorine, Total Ultra High Range	Nickel Low Range	Silica Low Range
Chromium(VI) Low Range	Nickel High Range	Silica High range
Chromium(VI) High Range	Nitrate	Silver
COD Low Range (16 mm vial)*	Nitrate (16 mm vial)	Sulfate
COD Medium Range (16 mm vial)*	Nitrite Ultra Low Range, Marine	Surfactants, Anionic
COD HR (16 mm vial)*	Nitrite Low Range	Zinc
Color of Water	Nitrite High Range	
Copper Low Range	Nitrogen, Total Low Range (16 mm vial)	

*COD Rapid Method available.

HANNA® instruments

Analytical Testing for the Food Industry

COD Reactor for Digestion Vials

A COD reactor is used to heat the digestion vials. The digestion vials must be heated to a specific temperature for a period time making the HI839800 an important accessory required to have a complete wastewater treatment monitoring system.

COD Certified Standards and Reagents

- Pre-dosed reagents for ease of use
- Supplied with certificate of quality
- Marked with expiration date and lot number for traceability

Reagents (Box of 25 vials)	COD LR: 0 to 150 mg/L	COD MR: 0 to 1500 mg/L	COD HR: 0 to 15000 mg/L
Dichromate EPA*	**HI93754A-25**	**HI93754B-25**	–
Dichromate Mercury Free**	**HI93754D-25**	**HI93754E-25**	–
Dichromate ISO***	**HI93754F-25**	**HI93754G-25**	–
Dichromate	–	–	**HI93754C-25**

Standards (500 mL bottle)	500 ppm COD standard	14000 ppm COD standard
	HI93754-11	**HI93754-12**

Notes:
*Method with chromium-sulfuric acid is officially recognized by EPA for wastewater analysis.
**This method is recommended for general purpose analysis with no chloride interference.
*** Method follows the official method ISO 15705. COD MR ISO method is 0-1000 mg/L.
    Meter can read higher.

hannainst.com.au

Precision Turbidity Benchtop Meter

EPA Compliant

The HI88703 Precision Turbidity Benchtop Meter is specially designed for water quality measurements, providing reliable and accurate readings, especially in the low turbidity range.

- Backlit graphic LCD display
- Ratio and non-ratio measurement modes.
- Normal, continuous, or signal averaging measurement reading modes available.
- Turbidity can be read as Nephelometric Turbidity Units (NTU), European Brewing Convention units (EBC), or Nephelos units.
- GLP data
  - GLP (Good Laboratory Practice) functions that allow traceability of the calibration conditions. Data includes calibration points, date, and time.

- AMCO AEPA-1 primary turbidity standard
- Data logging
  - Up to 200 measurements can be stored in the internal memory and recalled at any time.
- Data transfer
  - Logged data can be transferred to a Windows compatible PC via the RS232 or USB port and HI92000 software.

Specifications		HI88703
Non-ratio Mode	Range	0.00 to 9.99; 10.0 to 40.0 NTU; 0.0 to 99.9; 100 to 268 Nephelos; 0.00 to 9.80 EBC
	Resolution	0.01; 0.1 NTU; 0.1; 1 Nephelos; 0.01 EBC
Ratio Mode	Range	0.00 to 9.99; 10.0 to 99.9; 100 to 4000 NTU; 0.0 to 99.9; 100 to 26800 Nephelos; 0.00 to 9.99; 10.0 to 99.9; 100 to 980 EBC
	Resolution	0.01; 0.1; 1 NTU; 0.1; 1 Nephelos; 0.01; 0.1, 1 EBC
Additional Specifications	Range Selection	automatic
	Accuracy	±2% of reading plus 0.02 NTU (0.15 Nephelos; 0.01 EBC); ±5% of reading above 1000 NTU (6700 Nephelos; 245 EBC)
	Repeatability	±1% of reading or 0.02 NTU (0.15 Nephelos; 0.01 EBC) whichever is greater
	Method	nephelometric method (90°) or ratio nephelometric method (90° & 180°), adaptation of the USEPA method 180.1 and standard method 2130 B
	Measuring Mode	normal, average, continuous
	Turbidity Standards	<0.1, 15, 100, 750 and 2000 NTU
	Calibration	two, three, four or five-point calibration
Ordering Information		**HI88703-01** (115V) and **HI88703-02** (230V) is supplied with sample cuvettes and caps (5), calibration cuvettes (HI88703-11), silicone oil (HI98703-58), cuvette wiping cloth, power cord, instrument quality certificate, and instruction manual.

HANNA®
instruments

Analytical Testing for the Food Industry

Turbidity Meter

Fast Tracker™ Technology, EPA Compliant

The HI98703 Precision Turbidity Portable Meter is specially designed for water quality measurements, providing reliable and accurate readings, especially in the low turbidity range. The instrument is based on a state-of-the-art optical system which guarantees accurate results, assures long term stability, and minimizes stray light and color interferences.

- Backlit LCD display
- GLP data
  - GLP (Good Laboratory Practice) functions that allow traceability of the calibration conditions. Data includes calibration points, date, and time.
- AMCO AEPA-1 primary turbidity standard
- Data logging
  - Up to 200 measurements can be stored in the internal memory and recalled at any time.
- Data transfer
  - Logged data can be transferred to a Windows compatible PC via the RS232 or USB port and HI92000 software.

Fast Tracker™ – Tag Identification System

Install tags near your sampling points for quick and easy iButton® readings. Each tag contains a computer chip with a unique identification code encased in stainless steel. You can install a practically unlimited amount of tags.

Specifications	HI98703
Range	0.00 to 9.99 NTU; 10.0 to 99.9 NTU; 100 to 1000 NTU
Range Selection	automatic
Resolution	0.01; 0.1; 1
Accuracy	±2% of reading plus 0.02 NTU
Repeatability	±1% of reading or 0.02 NTU, whichever is greater
Method	ratio nephelometric method (90° and 180°), ratio of scattered and transmitted light; adaptation of the USEPA method 180.1 and standard method 2130 B
Measuring mode	normal, average, continuous
Turbidity Standards	<0.1, 15, 100 and 750 NTU
Calibration	two, three or four-point calibration
Ordering Information	**HI98703-01** (115V) and **HI98703-02** (230V) are supplied with iButton® tags with tag holders (5), sample cuvettes and caps (5), calibration cuvettes, silicone oil (HI98703-58), cuvette wiping cloth, batteries, AC adapter, instruction manual, instrument quality certificate, and rugged carrying case.

HANNA®instruments

Digital Refractometers

for Sugar Analysis Throughout the Food Industry

Hanna offers five sugar refractometers to meet the requirements of the food industry. These instruments utilize internationally recognized references for unit conversion and temperature compensation and employ methodology recommended in the ICUMSA Methods Book (internationally recognized body for sugar analysis).

Temperature (in °C or °F) is displayed simultaneously with the measurement on the large dual-level display along with icons for low power and other helpful messages.

- Displays measurement and temperature readings simultaneously

- Automatic Temperature Compensation (ATC)

- Easy measurement
  - Place a few drops of the sample in the well and press the READ key.

- BEPS
  - Alerts the user of low battery power that could adversely affect readings.

- IP65 water protection
  - Built to perform under harsh conditions.

- Readings are displayed in approximately 1.5 seconds

- One-point calibration
  - Calibrate with distilled or deionized water.

- Sample size can be as small as 2 metric drops

- Automatic shut-off after three minutes of non-use

- Stainless steel sample well
  - Easy to clean and corrosion-resistant.

HANNA®
instruments

Five Digital Refractometers for Sugar Analysis to Choose from.

HI96800

Measures the refractive index in aqueous solutions. Readings can also be displayed with sucrose temperature compensation (nD_{20}) or % Brix.

HI96801

Measures the refractive index to determine the % Brix of sugar in aqueous solutions. The refractive index of the sample is converted to % Brix concentration units.

HI96802

Measures the refractive index to determine the % fructose in aqueous solutions. The refractive index of the sample is converted to % mass (% w/w) concentration units.

HI96803

Measures the refractive index to determine the % glucose in aqueous solutions. The refractive index of the sample is converted to % mass (% w/w) concentration units.

HI96804

Measures the refractive index to determine the % invert sugar in aqueous solutions. The refractive index of the sample is converted to % mass (% w/w) concentration units.

Specifications		HI96800	HI96801	HI96802	HI96803	HI96804
Sugar Content	Range	1.3300 to 1.5080 nD; 1.3330 to 1.5040 nD_{20}; 0.0 to 85.0% Brix	0 to 85% Brix	0 to 85% mass (% w/w fructose)	0 to 85% mass (% w/w glucose)	0 to 85% mass (% w/w invert sugar)
	Resolution	0.0001 nD; 0.0001 nD_{20}; 0.1 % Brix	0.1 % Brix	0.1 % mass	0.1 % mass	0.1 % mass
	Accuracy (@25°C/77°F)	±0.0005 nD; ±0.0005 nD_{20}; ±0.2% Brix	±0.2% Brix	±0.2% mass	±0.2% mass	±0.2% mass
Temperature	Range	0.0 to 80.0°C (32.0 to 176.0°F)				
	Resolution	0.1°C (0.1°F)				
	Accuracy (@25°C/77°F)	±0.3°C (±0.5°F)				
Ordering Information		**HI96800, HI96801**, **HI96802**, **HI96803** and **HI96804** are supplied with battery and instruction manual.				
Standard		**HI4020-11** Brix standard 50%, 10 mL				

HANNA® instruments

Digital Refractometer

for Sodium Chloride Measurement in the Food Industry

Hanna offers the HI96821 digital sodium chloride refractometer to meet the requirements of the food industry. This optical instrument employs the measurement of the refractive index to determine sodium chloride concentration in aqueous solutions used in food preparation. The instrument utilizes internationally recognized references for unit conversion and temperature compensation. It can display the measurement of NaCl concentration 4 different ways: g/100 g, g/100 mL, Specific Gravity, and °Baumé.

- High accuracy measurements in g/100 g, g/100 mL, specific gravity and °Baume
- Displays measurement and temperature readings simultaneously
- Automatic Temperature Compensation (ATC)
- Easy measurement
  - Place a few drops of the sample in the well and press the READ key.
- BEPS
  - Alerts the user of low battery power that could adversely affect readings.

- IP65 water protection
  - Built to perform under harsh conditions.
- Readings are displayed in approximately 1.5 seconds
- One-point calibration
  - Calibrate with distilled or deionized water.
- Sample size can be as small as 2 metric drops
- Automatic shut-off after three minutes of non-use
- Stainless steel sample well
  - Easy to clean and corrosion-resistant.

HANNA® instruments   Analytical Testing for the Food Industry

Refractometers

Refractometers provide an effective, easy way to determine salt or sugar content in foods. As light passes through a substance containing salts, sugars and other dissolved solids, it is bent or refracted. An LED light is shone through the sample, which then passes through a prism that is in contact with the solution. The critical angle, the angle where the light is no longer refracted but reflected, is determined by a photodiode light sensor, which in turn determines the solution's refractive index. The refractive index is then converted in a specialized algorithm to sugar/Brix, salt, specific gravity, or other parameter, depending on the desired results units. It is important to note refractometers are not selective: they cannot differentiate between sugar and salt or differentiate types of sugars. Refractometers only measure total concentration of refractive substances. Hanna's digital refractometers measure and compensate for temperature, which highly influences the refractive index of a solution. Automatic temperature compensation (ATC) eliminates the need for a temperature correlation chart and ensures accurate measurement.

These digital refractometers eliminate the uncertainty associated with mechanical refractometers and are ideal for measurements in the field.

Specifications		HI96821
g/100 g	Range	0 to 28
	Resolution	0.1
	Accuracy (@25°C/77°F)	±0.2
g/100 mL	Range	0 to 34
	Resolution	0.1
	Accuracy (@25°C/77°F)	±0.2
Specific Gravity (S.G.)	Range	1.000 to 1.216
	Resolution	0.001
	Accuracy (@25°C/77°F)	±0.002
°Baumé	Range	0 to 26
	Resolution	0.1
	Accuracy (@25°C/77°F)	±0.2
Temperature	Range	0 to 80°C (32 to 176°F)
	Resolution	0.1°C (0.1°F)
	Accuracy (@25°C/77°F)	±0.3°C (±0.5°F)
Ordering Information	**HI96821** is supplied with battery and instruction manual.	

Parameter Highlight

Temperature

Temperature is an important parameter throughout many stages of the food production process; from manufacturing, to pasteurization, to storage, temperature measurement is essential. There are a variety of thermometer technologies that can be utilized to obtain these temperature measurements. Thermocouple thermometers provide a fast response, are capable of measurement at very high temperatures, and provide moderate accuracy. Thermistor thermometers offer high accuracy with a moderate response time within a limited temperature range. Hanna offers a variety of thermometers and application specific probes for all temperature measuring needs.

Application Highlight

Monitoring Temperature in Confectionaries

In confectionaries, temperature of the sugar syrup will dictate the consistency of the final product. For caramel or other soft candies, the sugar syrup is heated to 250°F (121°C); a brittle hard candy, such as a lollipop, requires the sugar syrup to be heated to 300°F (148°C). A few degrees temperature variation may cause significant differences from one batch to the next. Thermistor thermometers, such as the HI93501, offer a high level of accuracy for accurate temperature monitoring in the confectionary production process.

HANNA instruments   Analytical Testing for the Food Industry

Thermistor Thermometer

Food service, food preparation, packaging, storage and transport of food require temperature to be monitored or controlled. Spot checking temperatures with Hanna food thermometers ensures daily work routines are carried out at the correct temperature.

HI93501 is a thermistor style thermometer that includes a stainless steel replaceable style penetration probe (FC762PW).

Standard features include waterproof casing (rated IP65)** and stainless steel penetration probe designed for continuous contact with foodstuffs in accordance with regulation (EC) number 1935/2004. HI93501 also includes features such as CAL Check, low battery detection, auto-off capability, and long battery life.

- EN 13485 compliant
- CAL Check™ feature
- Remaining battery life indication/ low battery detection
- 4500 hour battery life
- Auto-off
- IP65 waterproof casing**

HI710026 blue rubber protective boot available

Interchangeable with FC762 series thermistor probes

Specifications	HI93501
Range*	-50.0 to 150.0°C; -58.0 to 302.0°F
Resolution	0.1°C; 0.1°F
Meter Accuracy @ 23.0°C ±5°C	±0.1°C (-50.0 to 150.0°C); ±0.2°F (-58.0 to 302.0°F)
Probe Accuracy (FC762PW)	±0.3°C (-10.0 to 80.0°C); ±0.5°F (-14 to 176°F); ±0.7°C / ±1.3°F remaining range
Probe	FC762PW general purpose penetration probe with 1 m (3.3') white cable and white handle
Certification	EN 13485:2001 suitability: storage and transport; climatic environment: E; accuracy class: 1;
Ordering Information	**HI93501** is supplied with FC762PW temperature probe, 1.5V AAA batteries (3), and instructions.

* The measurement range may be limited by probe type, and applies to the probe shaft.
** Water-resistant seal when used with compatible FC762 series probes

HANNA® instruments

FC762 Foodcare Thermistor Probes

FC762PW **Foodcare Penetration Probe, General Purpose**

Specifications	
Code	**FC762PW**
Sensor	NTC Thermistor
Range	-50 to 150°C (-58 to 302°F)
Accuracy	±0.3°C (-10 to 80°C)/ ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F (outside)
Interchange Error	±0.2°C (±0.4°F)
Connector Type	RCA
Response time (90% of final value)	6 seconds
Probe Dimensions	L 100 mm x dia 3 mm (3.9 x 0.12")
Probe Material	AISI 316 stainless steel
Probe Handle	Polypropylene (PP)
Probe Handle Color	white
Cable Type	PVC/straight
Cable Length	white / 2 m (6.6')

Specifications	
Code	**FC762W1/2**
Sensor	NTC Thermistor
Range	-50 to 150°C (-58 to 302°F)
Accuracy	±0.3°C (-10 to 80°C)/ ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F (outside)
Interchange Error	±0.2°C (±0.4°F)
Connector Type	RCA
Response time (90% of final value)	2 min 45 sec (98%FS)
Probe Dimensions	L 50 mm x dia 3.6 mm (2" x 0.14")
Probe Material	AISI 316 stainless steel
Cable Type	PVC/straight
Cable Length	white / 2 m (6.6')

FC762W1/2 **Foodcare Wire probe designed for liquid immersion**

Probe does not incorporate a handle.

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FC762N2 **Foodcare Probe for Tanks, Vessels, and Vats**

Specifications	
Code	**FC762N2**
Sensor	NTC Thermistor
Range	-50 to 150°C (-58 to 302°F)
Accuracy	±0.3°C (-10 to 80°C)/ ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F (outside)
Interchange Error	±0.2°C (±0.4°F)
Connector Type	RCA
Probe Dimensions	L 1000 mm x 10 mm (39" x 0.39")
Probe Material	Stainless steel
Probe Handle	PVDF
Probe Handle Color	white
Cable Type	PVC/straight
Cable Length	white / 2 m (6.6')

Calibration Test Keys

for Thermometers Using FC762 Probes

For measurements that are always reliable, thermometers must be calibrated periodically.

Hanna test keys offer a fast and simple way of checking the accuracy of your instruments.

Connect the key to the probe input. If the reading on the display differs more than 0.4°C (0.8°F) from the key rated value, your thermometer should be recalibrated at our technical service center.

HI762-18C	Test key at -18°C
HI762000C	Test key at 0°C
HI762070C	Test key at 70°C
HI762-004F	Test key at -0.4°F
HI762032F	Test key at 32°F
HI762158F	Test key at 158°F

For periodic verification of your thermometer's calibration, it is recommended to check at least two points. Choose the test keys with the nominal values closest to the temperature usually measured.

HANNA®
instruments

K-Type Thermocouple Thermometer

Food service, food preparation, packaging, storage and transport of food require temperature to be monitored or controlled. Spot checking temperatures with Hanna food thermometers ensures daily work routines are carried out at the correct temperature.

HI935001 is a thermometer that includes a K-type thermocouple stainless steel replaceable style penetration probe (FC766PW). This thermometer offers a large range of temperature measurement; from -50 to 300°C (-58.0 to 572°F).

Standard features include waterproof casing (rated IP65) and stainless steel penetration probe designed for continuous contact with foodstuffs in accordance with regulation (EC) number 1935/2004. HI935001 also includes features such as CAL Check, low battery detection, auto-off capability, and long battery life.

- K-type penetration thermocouple probe
- CAL Check™ feature
- Remaining battery life indication /low battery detection
- Auto-off
- IP65 Waterproof casing

Interchangeable with FC766 series thermocouple probes

HI710027 blue rubber protective boot available

Specifications	HI935001
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC766PW)	±1.6°C (-50.0 to 300°C); ±2.9°F (-58.0 to 572°F)
Probe	FC766PW penetration, K-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI935001** is supplied with FC766PW temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions. **HI935001-03** includes the above without probe.

* The measurement range may be limited by probe type, and applies to the probe shaft.

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T-Type Thermocouple Thermometer

Food service, food preparation, packaging, storage and transport of food require temperature to be monitored or controlled. Spot checking temperatures with Hanna food thermometers ensures daily work routines are carried out at the correct temperature.

HI935004 is a thermometer that includes a T-type thermocouple stainless steel replaceable style penetration probe (FC767PW). This thermometer offers temperature measurement from -50 to 300°C (-58.0 to 572°F).

Standard features include waterproof casing (rated IP65) and stainless steel penetration probe designed for continuous contact with foodstuffs in accordance with regulation (EC) number 1935/2004. HI935004 also includes features such as CAL Check, low battery detection, auto-off capability, and long battery life.

- EN 13485 compliant
- T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casing

Interchangeable with FC767 series thermocouple probes

HI710027 blue rubber protective boot available

Specifications	HI935004
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC767PW)	±0.6°C (-50 to 100.0°C); ±1.6°C (100.0 to 300°C); ±1.1°F (-58 to 212°F); ±2.9°F (212 to 572°F)
Probe	FC767PW penetration, T-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI935004** is supplied with FC767PW temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions. **HI935004-03** includes the above without probe.

* The measurement range may be limited by probe type, and applies to the probe shaft.
** Water-resistant seal when used with compatible FC767 series probes

HANNA® instruments

K-Type Thermocouple Thermometer

with fixed probe

Food service, food preparation, packaging, storage and transport of food require temperature to be monitored or controlled. Spot checking temperatures with Hanna food thermometers ensures daily work routines are carried out at the correct temperature.

HI935007 is a thermometer that incorporates a fixed K-type thermocouple stainless steel penetration probe to provide the greatest accuracy. This thermometer offers a large range of temperature measurement; from -50 to 300°C (-58.0 to 572°F).

Standard features include waterproof casing (rated IP65) and stainless steel penetration probe designed for continuous contact with foodstuffs in accordance with regulation (EC) number 1935/2004. HI935007 also includes features such as CAL Check, low battery detection, auto-off capability, and long battery life.

- Fixed K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication/ low battery detection
- Auto-off
- IP65 Waterproof casing

Fixed thermocouple probe

HI710026 blue rubber protective boot available

Specifications	HI935007
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
System Accuracy (Meter @ 23.0°C ±5°C)	±1°C (-50.0 to 100.0°C) / ±2 °C (100.0 to 300°C); ±1.8°F (-58.0 to 212°F) / ±3.6 °F (212 to 572°F)
Probe	fixed penetration, K-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI935007** is supplied with fixed temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

* The measurement range applies to the probe shaft.

T-Type Thermocouple Thermometer

with fixed probe

Food service, food preparation, packaging, storage and transport of food require temperature to be monitored or controlled. Spot checking temperatures with Hanna food thermometers ensures daily work routines are carried out at the correct temperature.

HI935008 is a thermometer that incorporates a fixed T-type thermocouple stainless steel penetration probe to provide the greatest accuracy. This thermometer offers temperature measurement from -50 to 300°C (-58.0 to 572°F).

Standard features include waterproof casing (rated IP65) and stainless steel penetration probe designed for continuous contact with foodstuffs in accordance with regulation (EC) number 1935/2004. HI935008 also includes features such as CAL Check, low battery detection, auto-off capability, and long battery life.

- EN 13485 compliant
- Fixed T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casing

Fixed thermocouple probe

HI710026 blue rubber protective boot available

Specifications	HI935008
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
System Accuracy (Meter @ 23.0°C ±5°C)	±0.5°C (-50.0 to 100.0°C); ±1°C (100.0 to 300°C); ±0.9°F (-58.0 to 212°F); ±1.8°F (212 to 572°F)
Probe	fixed penetration, T-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI935008** is supplied with fixed temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

* The measurement range applies to the probe shaft.

HANNA® instruments

K-Type Thermocouple Thermometer

with ultra-fast probe

The HI9350011 is a waterproof portable K-Type thermocouple thermometer made for the food professional that is required to monitor temperature as part of a hazardous analysis of critical control points (HACCP) plan.

This Foodcare thermometer is supplied with the replaceable FC766C1 Ultra-Fast K-Type thermocouple probe that will reach 90% of the final reading within 4 seconds. The tip of FC766C1 is just 1.6 mm (0.06") in diameter allowing for easy penetrations into solids and semi-solids. The AISI 316 stainless steel body is 95 mm (3.7") long and is safe for food contact in compliance with Regulation (EC) 1935/2004.

- Ultra-fast K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication/ low battery detection
- Auto-off
- IP65 Waterproof casing

HI710027 blue rubber protective boot available

Interchangeable with FC766 series thermocouple probes

Specifications	HI9350011
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC766C1)	±1.6°C (-50.0 to 300°C); ±2.9°F (-58.0 to 572°F)
Probe	FC766C1 penetration, K-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI9350011** is supplied with FC766C1 temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

*The measurement range may be limited by probe type, and applies to the probe shaft.
** Water-resistant seal when used with compatible FC766 series probes

HANNA®instruments Analytical Testing for the Food Industry

T-Type Thermocouple Thermometer

with ultra-fast probe

The HI9350041 is a waterproof portable T-Type thermocouple thermometer made for the food professional that is required to monitor temperature as part of a hazardous analysis of critical control points (HACCP) plan.

This Foodcare thermometer is supplied with the replaceable FC767C1 Ultra-Fast T-Type thermocouple probe that reaches 90% of the final reading within 4 seconds. The tip of FC767C1 is just 1.6 mm (0.06") in diameter allowing for easy penetrations into solids and semi-solids. The AISI 316 stainless steel body is 95 mm (3.7") long and is safe for food contact in compliance with Regulation (EC) 1935/2004.

The HI9350041 with the HI767C1 is certified according to EN13485:2001 standard that has strict requirements for accuracy, response time, operating and storage conditions as applied to the measurement of product temperature which are intended for use in transportation, storage and distribution facilities of refrigerated, frozen or deep-frozen food and ice cream.

- Ultra-fast T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casing

Interchangeable with FC767 series thermocouple probes

HI710027 blue rubber protective boot available

Specifications	HI9350041
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC767C1)	±0.6°C (-50 to 100.0°C); ±1.6°C (100.0 to 300°C); ±1.1°F (-58 to 212°F); ±2.9°F (212 to 572°F)
Probe	FC767C1 penetration, T-type thermocouple probe with 1 m (3.3') white cable and white handle
Ordering Information	**HI9350041** is supplied with FC767C1 temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

* The measurement range may be limited by probe type, and applies to the probe shaft.
** Water-resistant seal when used with compatible FC767 series probes

HANNA® instruments

Foodcare K-Type Thermocouple Probes

FC766PW **Foodcare Penetration Probe**

Specifications	
Code	**FC766PW**
Max. Temperature	300°C (570°F)
Response time (90% of final value)	13 seconds
Probe Dimensions	L 120 mm x dia 3 mm (4.7 x 0.12")
Probe Material	stainless steel
Probe Handle	Polypropylene (PP)
Cable Length	1 m (3.3')

FC766C1 **Foodcare Ultra-fast Probe**

Specifications	
Code	**FC766C1**
Max. Temperature	300°C (570°F)
Accuracy	±1.6°C (-50 to 300°C)/ ±2.9°F (-58 to 573 °F)
Response time (90% of final value)	3 seconds
Probe Dimensions	L 100 mm x dia 3 mm (3.9 x 0.12")
Probe Material	AISI 316 stainless steel
Probe Handle	Polypropylene (PP)
Cable Length	1 m (3.3')

FC766TR2 **Foodcare Penetration Probe for Semi-Solid Samples**

Specifications	
Code	**FC766TR2**
Range	-40 to 250°C (-40 to 482°F)
Response time (90% of final value)	14 seconds
Probe Dimensions	L 1000 mm x dia 10 mm (3.3' x 0.39")
Probe Material	stainless steel
Probe Handle	stainless steel
Cable Length	2 m (6.6')

Thermometers | Portable | Thermocouple Probes

Foodcare K-Type Thermocouple Extensions and Probe

FC766PF1 **Foodcare Stainless Steel Probe with Exposed Sensor**

The FC766PF1 is a K-type thermocouple temperature probe that is ideal for measuring samples at very high temperatures, such as in industrial applications and is recommended to be used with the FC766HD probe handle and/or FC766EX extension cable.

Specifications	
Code	**FC766PF1**
Range	-40 to 300°C
Probe Dimensions	L100mm x dia 1.5mm
Probe Material	stainless steel
Sensor	exposed wires

FC766HD **Foodcare Probe Handle**

A rugged, PVC handle with a 1 meter (3.3') cable. It is provided with a female connector, which allows the connection of any FC766Px probe.

Specifications	
Code	**FC766HD**
Probe Handle	Polypropylene (PP)
Cable Length	1 m (3.3')

FC766EX **Foodcare Extension Cable**

A coiled cable which extends the probe cable by 1 m (3.3') , with two connectors at the two ends (1 male and 1 female).

Specifications	
Code	**FC766EX**
Cable Length	1 m (3.3')

HANNA® instruments

Foodcare K-Type Thermocouple Probes for Specific Applications

FC766F **Foodcare Wire Probes for Hard to Reach Places**

Specifications	
Code / Cable Length	**FC766F/1** / 1 m (3.3')
	FC766F/3 / 3 m (9.9')
	FC766F/5 / 5 m (16.4')
	FC766F/10 / 10 m (33')
	FC766F/20 / 20 m (66')
Range	-40 to 400°C (-40 to 752°F)
Response time (90% of final value)	14 seconds
Probe Dimensions	dia 2 mm (0.08'')
Sensor	exposed wire
Cable Type	Fiberglass insulated/straight

FC766Y **Foodcare Wire Probes for Ovens and Furnaces**

Specifications	
Code / Cable Length	**FC766Y/1** / 1 m (3.3')
	FC766Y/2 / 2 m (6.6')
	FC766Y/3 / 3 m (9.9')
	FC766Y/5 / 5 m (16.4')
	FC766Y/8 / 8 m (26')
	FC766Y/10 / 10 m (33')
Range	-40 to 1000°C (-40 to 1832°F)
Response time (98% of final value)	15 seconds
Probe Dimensions	L 1000 mm x dia 1.5 mm (39" x 0.06")
Probe Material	stainless steel
Cable Type	Stainless Steel/straight

FC766W1 **Foodcare Wires Probes with Insulated Cable**

Specifications	
Code / Cable Length	**FC766W1/1** / 1 m (3.3')
	FC766W1/3 / 3 m (9.9')
	FC766W1/5 / 5 m (16.4')
	FC766W1/10 / 10 m (33')
Range	-40 to 120°C
Response time (98% of final value)	2 min 30 sec
Probe Dimensions	L 44 mm x dia 5mm (1.7" x 0.2")
Probe Material	stainless steel
Cable Type	Polyurethane (PUR)/straight

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Foodcare K-Type Thermocouple Probes for Specific Applications

FC766T/1 **Foodcare Wire Probe for Hard to Reach Places**

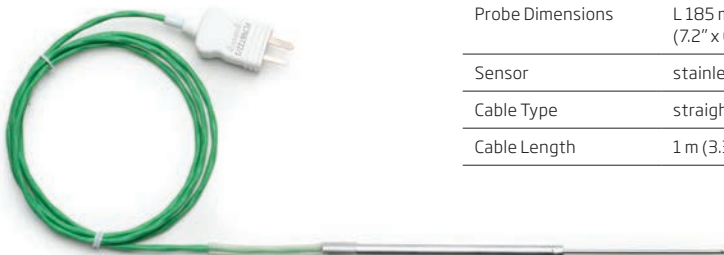| Specifications	
Code / Cable Length	**FC766T/1** / 1 m (3.3') **FC766T/3** / 3 m (9.9') **FC766T/5** / 5 m (16.4') **FC766T/7** / 7 m (23') **FC766T/10** / 10 m (33')
Range	-40 to 250°C (-40 to 482°F)
Probe Dimensions	dia 1.9 mm (0.07")
Sensor	exposed wire
Cable Type	PTFE insulated/straight

FC766TZ **Foodcare Wire Stainless Steel Probes for Sous Vide**

Specifications	
Code / Probe Dimensions	**FC766TZ/30** / L 30 mm x dia 1 mm (1.18" x 0.04") **FC766TZ/60** / L 60 mm x dia 1 mm (2.36" x 0.04") **FC766TZ/120** / L 120 mm x dia 1 mm (4.7" x 0.04")
Range	-40 to 200°C
Sensor	stainless steel
Cable Type	PTFE insulated/straight
Cable Length	1 m (3.3')

FC766TZ2/1 **Foodcare Wire Stainless Steel Penetration Probe**

Specifications	
Code	**FC766TZ2/1**
Range	-40 to 600°C
Probe Dimensions	L 185 mm x dia 1.8 mm (7.2" x 0.07")
Sensor	stainless steel
Cable Type	straight
Cable Length	1 m (3.3')

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Foodcare T-Type Thermocouple Probes

FC767C1 **Foodcare Ultra-fast Probe**

Specifications	
Code	**FC767C1**
Response time (90% of final value)	4 seconds
Probe Dimensions	L 100 mm x dia 3 mm (3.9" x 0.12")
Probe Material	AISI 316 stainless steel
Probe Handle	Polypropylene (PP)
Cable Length	1 m (3.3')

FC767PW **Foodcare Penetration Probe**

Specifications	
Code	**FC767PW**
Range	300°C (570°F)
Accuracy	±0.6°C (-50 to 100.0°C); ±1.6°C (100.0 to 300°C) / ±1.1°F (-58 to 212 °F); ±2.9°F (212 to 573 °F)
Response time (90% of final value)	15 seconds
Probe Dimensions	L 120 mm x dia 3 mm (4.7" x 0.12")
Probe Material	stainless steel
Probe Handle	Polypropylene (PP)
Cable Length	1 m (3.3')

FC767TR2 **Foodcare Penetration Probe for Semi-Solid Samples**

Specifications	
Code	**FC767TR2**
Range	-40 to 250°C (-40 to 482°F)
Response time (90% of final value)	14 seconds
Probe Dimensions	L 1000 mm x dia 10 mm (39" x 0.4")
Probe Material	stainless steel
Probe Handle	stainless steel
Cable Length	2 m (6.6')

HANNA® instruments   Analytical Testing for the Food Industry

Foodcare T-Type Thermocouple Probes for Specific Applications

FC767W1/1 **Foodcare Wire Probe with Insulated Cable**

Specifications	
Code	**FC767W1/1**
Range	-40 to 120°C
Response time (98% of final value)	2min 10 sec
Probe Dimensions	L 44 mm x dia 5mm (1.7" x 0.2")
Probe Material	stainless steel
Cable Type	Polyurethane (PUR)/straight
Cable Color/Length	white/1 m (3.3')

FC767Y/1 **Foodcare Wire Probe for Ovens and Furnaces**

Specifications	
Code	**FC767Y/1**
Range	-40 to 1000°C (-40 to 1832°F)
Response time (98% of final value)	15 seconds
Probe Dimensions	L 1000 mm x dia 1.5 mm (39" x 0.06")
Probe Material	stainless steel
Cable Type	Stainless Steel/straight
Cable Length	1 m (3.3')

FC767F/1 **Foodcare Wire Probe for Hard to Reach Places**

Specifications	
Code	**FC767F/1**
Range	-40 to 400°C (-40 to 752°F)
Response time (90% of final value)	14 seconds
Probe Dimensions	dia 2 mm (0.08")
Sensor	exposed wire
Cable Type	Fiberglass insulated/straight
Cable Length	1 m (3.3')

HANNA® instruments

Application Highlight

Monitoring Refrigerated Trucks

Monitoring temperature of refrigerated trucks is essential during food transport. Chilled meats must remain below 7°C during transport; the temperature of milk must remain below 8°C post pasteurization. Data loggers ensure temperatures in storage and during transport do not exceed quality control and federally regulated temperature limits. Hanna's HI141 temperature loggers are available with internal or external sensors, an LCD for real-time temperature readings and alarm settings for minimum and maximum temperatures. An indicating red LED will alert the user at a glance if the temperature exceeds an alarm setting at any point during a logging period, allowing for easy quality control monitoring.

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Waterproof Thermologgers

HI148 series of waterproof thermologgers are ideal for monitoring temperature in foodcare applications such as food processing, transportation, and horticulture.

These thermologgers feature an extensive memory capacity of 16,000 samples for 1-channel models and 8000 samples/channel for 2-channel models.

The HI92148 application software (required) supports communication between the logger

and a PC running Windows® OS through a USB-C cable. Using the application, data acquisition parameters are user selectable and logged data can be downloaded and stored via USB cable.
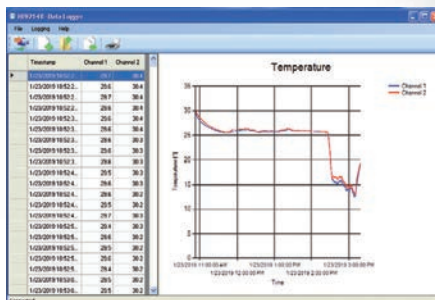
- IP67 waterproof casing

- One or two channels, with internal and/or external sensor

- 16,000 samples (for 1-channel models) or 8000 samples/channels (for 2-channels models)

- Programmable high and low alarms

- Programmable logging interval from 1 second to 24 hours for 1-channel models, from 2 seconds to 24 hours for 2-channel models

- Storing of temperature at logging interval, or min or max temperature between logging intervals

- Logging delay start from 1 second to 199 hours using the HI92148 PC application or the Log start button

- Security password and lot serial number

- USB Type-C connector

- Factory-calibrated.

- Wall cradle included

HANNA® instruments

USB connection

HI148-1
1 internal sensor
(shown with included wall cradle)

HI148-2
1 external sensor

HI148-3
1 internal and
1 external sensor

HI148-4
2 external sensors

wall mount cradle
included

Specifications		HI148 Series
Model	Sensors	
HI148-1	T1 internal	-20.0 to 60.0°C / -4.0 to 140.0°F
HI148-2	T1 external	-40.0 to 125.0°C / -40.0 to 257.0°F
HI148-3	T1 internal T2 external	-20.0 to 60.0°C / -4.0 to 140.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI148-4	T1 external T2 external	-40.0 to 125.0°C / -40.0 to 257.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
Resolution		0.1 °C (-40.0 to 100.0 °C); 0.2 °C (temp. >100.0 °C) 0.1 °F (-40.0 to 190.0 °F) ; 0.3°F (temp. >190.0 °F)
Accuracy		±0.5 °C (-40.0 to 0.0 and 70.0 to 100.0 °C); ±0.4 °C (0.0 to 70.0 °C); ±1.0 °C (>100.0 °C) ±1.0 °F (-40.0 to 32.0 and 158.0 to 212.0 °F); ±0.8 °F (32.0 to 158.0 °F); ±2.0 °F (>212.0 °F)
Additional Specifications	Probe	stainless steel probe with 1 m (3.3') silicone cable; 33.5 mm (13.2") length, 3.5 mm (0.14") diameter
	Battery Type / Life	1.5V AAA (3 pcs.) / approximately 2 years of use
Ordering Information		**HI148-1** (1 internal sensor) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual. **HI148-2** (1 external sensor) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual. **HI148-3** (1 internal, 1 external sensors) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual. **HI148-4** (2 external sensors) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual.

Portable Lux Meter

- Three measurement ranges
- Water-resistant housing
- 200 hour battery life with battery level indicator

The HI97500, is a portable lux meter designed to perform light measurements simply and accurately. The instrument is supplied with a light sensor connected by a fixed 1.5 m coaxial cable to allow measurements to be taken from a distance without any user interference.

Specifications	HI97500
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 with 1.5 m coaxial cable (fixed)
Ordering Information	**HI97500** is supplied with 9V battery, protective case and instructions.

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.

The Quality of Light

Quality of light is very important in agriculture. Too little light (or luminous intensity) affects the quantity and quality of crop performance.
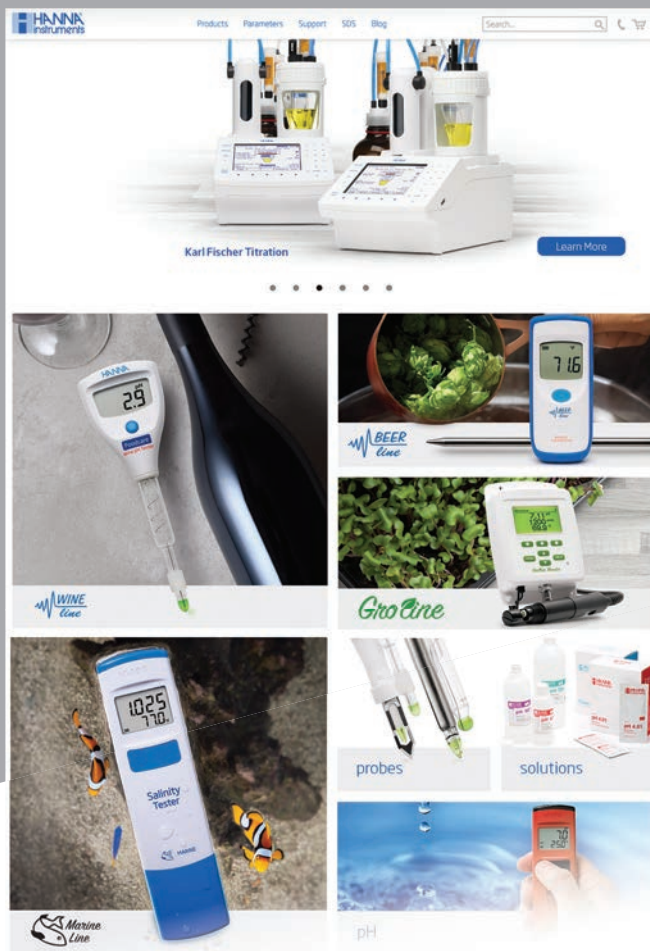
Luminous intensity is measured and reported in foot-candles (ft-c) or in lux (lx). One lux is equal to one lumen per square meter and one foot-candle is equal to one lumen per square foot. To convert measurements use the following formula:

foot-candle = lux x 0.0929

lux = foot-candle x 10.764

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