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Comparison Guides

HALO™ and Hanna Lab App

	pH Range	0.001 pH Resolution	Five-point pH Calibration	Calibration Buffers	GLP features	iPad Compatible	Bluetooth® Wireless Technology	Hanna Lab App Required	Data Logging	Body material	Recommended Application	Clogging Prevention	Battery Life	Page
HI11312	0.00-13.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	lab		500 hours	2.16
HI11102	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	lab		500 hours	2.17
HI13302	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	lab, test tube		500 hours	2.18
HI10832	0.00-13.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	lab, small sample		500 hours	2.19
HI12302	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28	•	PEI	field		500 hours	2.20
FC2022	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	PVDF	food		500 hours	2.21
HI10482	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	wine, must and juice	•	500 hours	2.23
FC2142	0.00-13.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	titanium	brewing		500 hours	2.25
HI12922	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	direct soil		500 hours	2.26
HI14142	0.00-12.00	•	•	up to 7	•	•	•	yes (page 2.28)	•	glass	flat surfaces		500 hours	2.27

edge®

	Bluetooth® Wireless Technology	Hanna Lab App Compatible	pH Measurement	EC/TDS Measurement	DO Measurement	pH CAL Check™	0.001 pH Resolution	Five-point pH Calibration	Two Custom pH Buffers	GLP Features	Capacitive Touch Buttons	Data Logging	8 Hour Battery Life	PC Connectivity	Benchtop, Portable & Wall-Mount	3.5 mm probe input	Page
edge®blu	•	•	•			•	•	•	•	•	•	•	•	•	•	•	2.8
edge			•	•*	•*	•	•	•	•	•	•	•	•	•	•	•	2.32
edge pH			•			•	•	•	•	•	•	•	•	•	•	•	2.36

* with optional compatible edge electrode

Research Grade pH Benchtop Meters

	Two Channels	ISE Measurement	EC/TDS Measurement	CAL Check™	0.001 pH Resolution	Five-point pH Calibration	Five Custom pH Buffers	GLP Features	Real Time Graphing	Data Logging	Incremental Methods	PC Connectivity	Fully Customizable	Page
HI5222	•	•		•	•	•	•	•	•	•	•	•	•	2.40
HI5221				•	•	•	•	•	•	•		•	•	2.44

Laboratory Grade pH Benchtop Meters

	mV	CAL Check	Temperature Measurement	Automatic Calibration	0.001 pH Resolution	Five-point pH Calibration	Two Custom pH Buffers	GLP Features	Data Logging	PC Connectivity	Magnetic Stirrer	Built-in Printer	Built-in Solution Holders	Analog Output	Page
HI122	•	•	•		•	•	•	•		•		•			2.46
HI2221	•	•	•	•		•		•	•	•					2.48
HI2211	•		•	•											2.49
HI2210			•	•											2.49
HI2209	•												•		2.50
HI22091	•												•	•	2.50
HI208			•	•							•				2.51

Comparison Guides

Waterproof Portable pH Meters

	ISE Measurement	mV Measurement	Temperature Measurement	0.001 pH Resolution	pH Sensor Check™	CAL Check	Automatic Calibration	Automatic Temperature Compensation	Log on Demand (records)	Two-point pH Calibration	Three-point Calibration	Five-point Calibration	Custom Buffers	Backlit LCD	GLP Features	PC Connectivity	Auto-off	Page
HI98190		•	•	•		•	•	•	300	•	•	•	•	•	•	•	•	2.52
HI9126		•	•	•		•	•	•		•			•				•	2.76
HI9125		•	•				•	•		•							•	2.77
HI9124			•				•	•		•							•	2.77
HI991003		•	•		•		•	•		•							•	2.78
HI991002		•	•				•	•		•							•	2.78
HI991001			•				•	•		•							•	2.78

Application Specific Portable Meters

	Temperature Measurement	BEPS	Automatic Temperature Compensation	Two-Point pH Calibration	Waterproof	Soil Measurement	Plating Baths	Boiler & Cooling Towers	Leather & Paper	Foodcare	Milk	Yogurt	Cheese	General Purpose Food	Drinking Water	Beer Analysis	Wine Analysis	Meat Measurement	pH of Skin	Page
HI98161	•		•	•	•					•										2.56
HI98162	•		•	•	•						•									2.60
HI98163	•		•	•	•													•		2.64
HI98164	•		•	•	•							•								2.68
HI98165	•		•	•	•								•							2.72
HI99121	•	•	•	•	•	•														2.79
HI99131	•	•	•	•	•		•													2.80
HI99141	•	•	•	•	•			•												2.81
HI99171	•	•	•	•	•				•											2.82
HI99181	•	•	•	•	•														•	2.83
HI99162	•	•	•	•	•						•									2.84
HI99164	•	•	•	•	•							•								2.88
HI99165	•	•	•	•	•								•							2.92
HI99161	•	•	•	•	•									•						2.96
HI99163	•	•	•	•	•													•		2.97
HI99192	•	•	•	•	•										•					2.98
HI99151	•	•	•	•	•											•				2.100
HI99111	•	•	•	•	•												•			2.102

Other Portable Meters

	mV Measurement	Temperature Measurement	Automatic Calibration	Automatic Temperature Compensation	HOLD Function	Two-Point pH Calibration	Low Battery Indicator	Pre-amplified pH Electrode	Auto-off	Page
HI8424	•	•	•	•	•	•	•		•	2.104
HI8314	•	•		•		•	•	•		2.105
HI83141	•	•		•		•	•			2.105
HI8014	•					•				2.106
HI8010						•				2.106
HI8427	•						•			2.107
HI931001	•									2.107

Specifications		edge®blu*
pH	Range[2]	-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	Basic mode: Automatic, up to 3 points calibration 5 standard buffer Standard mode: Automatic up to 5 points calibration 7 standard buffers (1.68†, 4.01 or 3.00, 6.86, 7.01, 9.18, 10.01, 12.45†) and 2 custom buffers†
	Temperature Compensation[2]	automatic, -5.0 to 100.0°C (23.0 to 212.0°F) (using integral temperature sensor)
	Electrode Diagnostics	standard mode: probe condition, response time, and out of calibration range
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
Temperature	Range[2]	-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
Additional Specifications	Probe	HI11102 HALO® glass body pH electrode with Bluetooth® Smart technology
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information	**HI2202-01** (115V) and **HI2202-02** (230V) edge blu includes: HI11102 HALO pH electrode with Bluetooth® Smart technology, pH 4 buffer solution sachets (4), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2), electrode cleaning solution sachets (2), battery for HALO, benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.	

HALO Specifications	HI11102 HALO (included)
Reference	double, Ag/AgCl
Junction	ceramic
Electrolyte	gel
Range	0.00 to 12.00 pH ±420 mV
Bulb Shape	spheric
Outer Diameter (glass)	12 mm (glass)
Overall Length	183 mm
Solution Temperature	-5.0 to 80.0°C (23.0 to 176.0°F)
Body Material	glass
Environment	0.0 to 50.0°C (32.0 to 122.0°F), electronic module is not waterproof
Temperature Sensor	integrated
Connection	Bluetooth® Smart (Bluetooth® 4.0), 10 m (33') range
Battery Type / Life	CR2032 3V lithium ion / approximately 500 hours

Hanna Lab App Specifications*	
Range[2]	-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 or 4.01, 6.86, 7.01, 9.18, 10.01, 12.45 pH)
Temperature Compensation[2]	automatic from -5.0 to 100.0°C; 23.0 to 212.0°F
Compatibility/System Requirements	see www.hannainst.

[2] Limits will be reduced to actual probe/sensor limits.
* HALO required for measurement use.
† Standard mode only

HI11312

HALO®

Ideal for lab applications

Compatible with:
iOS
Android™
edge®blu

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

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

Glass Body

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

Double Junction

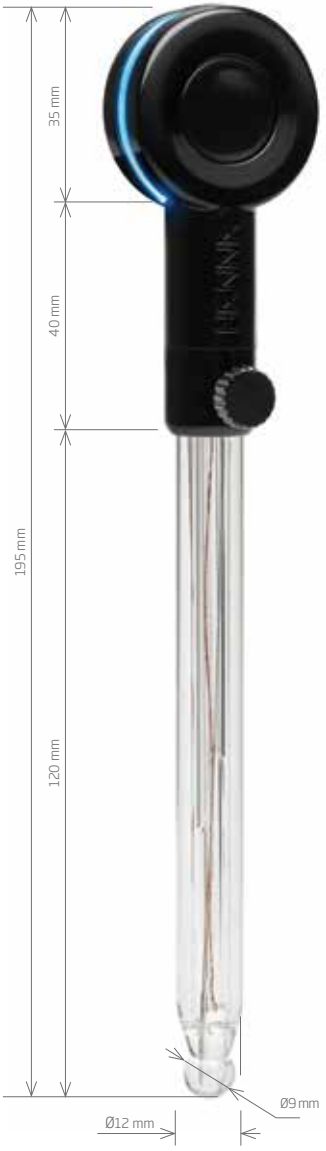
HI11312 is a double junction pH electrode in which the Ag/AgCl necessary for the reference cell is located behind an inner ceramic junction. The gel electrolyte between the inner and outer junction is silver free. This is important to prevent the precipitation of silver by Tris buffer, metals, and sulfides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

Built-in Temperature Sensor

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

Refillable

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



HALO Specifications	HI11312
Measurement Range	0.00 to 13.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	ceramic
Electrolyte	3.5M KCl (refillable)
Body Material	glass
Tip / Shape	spheric
Temperature Operating Range	-5 to 80°C (23 to 176°F)
Body Length/Overall Length	120 mm / 195 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI11312** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, fill solution, battery, quality certificate and instruction sheet.

Also included with edge®blu

HI11102

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for lab applications

HI11102 HALO is an innovative, pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. This general purpose, glass body pH electrode is ideal for users that would prefer a laboratory pH electrode without the refill solution maintenance.

- Glass body
  - Non-porous surface that withstands harsh chemicals
- Double junction
  - Silver free outer reference that is compatible with most samples
- Built-in temperature sensor
  - High accuracy temperature compensated measurements
- Gel-filled reference
  - Maintenance free with no fill solutions required

Glass Body

The glass body of the HI11102 is ideal for laboratory use and for users that prefer to have a traditional laboratory pH electrode without having to maintain the proper fill solution level. The glass is resistant to many harsh chemicals and is easy to clean.

Double Junction

HI11102 is a double junction pH electrode in which the Ag/AgCl necessary for the reference cell is located behind an inner ceramic junction. The gel electrolyte between the inner and outer junction is silver free. This is important to prevent the precipitation of silver by Tris buffer, metals, and sulfides that would clog the junction leading to erratic readings.

Built-in Temperature Sensor

HI11102 has a thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature reading while being in the tip of the electrode allows for a rapid determination of the temperature as it impacts the effect on the glass membrane potential.

Maintenance Free Gel-filled Reference

HI11102 contains a silver free gel in the outer reference cell. There is no fill solution to replenish as the probe is used. Other than routine calibration and cleaning, this probe is maintenance free.

HALO Specifications	HI11102
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	ceramic
Electrolyte	gel
Body Material	glass
Tip / Shape	spheric
Temperature Operating Range	-5 to 80°C (23 to 176°F)
Body Length/Overall Length	120 mm /183 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI11102** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

HI13302

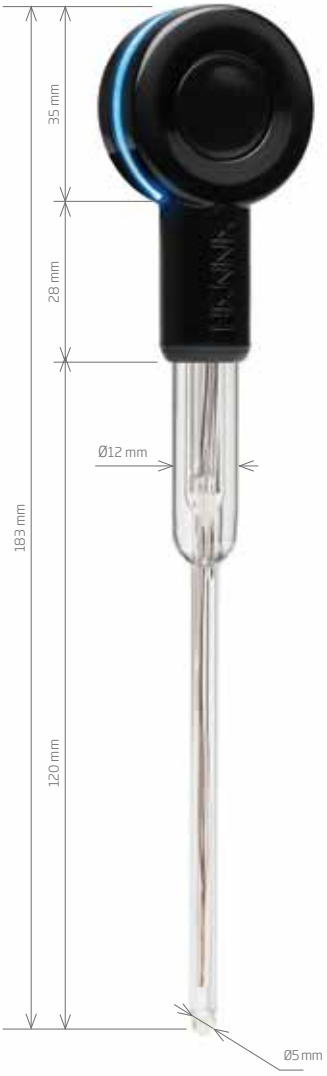
HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for test tube applications

HI13302 HALO is an innovative, application specific, pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. This electrode is designed for taking pH measurements in test tubes that are used by university, pharmaceutical, biotechnology, and food laboratories customers.

- Small diameter bulb and body
  - 5 mm diameter bulb fits easily into test tubes.
- Built-in temperature sensor
  - Provides accurate temperature compensated pH measurements
- Open junction
  - Permits a predictable flow rate of reference electrolyte for stability
- Gel-filled reference
  - Maintenance free with no fill solutions required



Small 5 mm Diameter Bulb and Body

HI13302 has a small pH-sensing bulb that is only 5 mm in diameter by 80 mm in length. The small diameter of the probe allows for pH measurements in test tubes, vials, and other small containers.

Built-in Temperature Sensor

HI13302 has a thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature while being in the tip of the electrode allows for a rapid temperature compensated measurement.

Open Junction Design

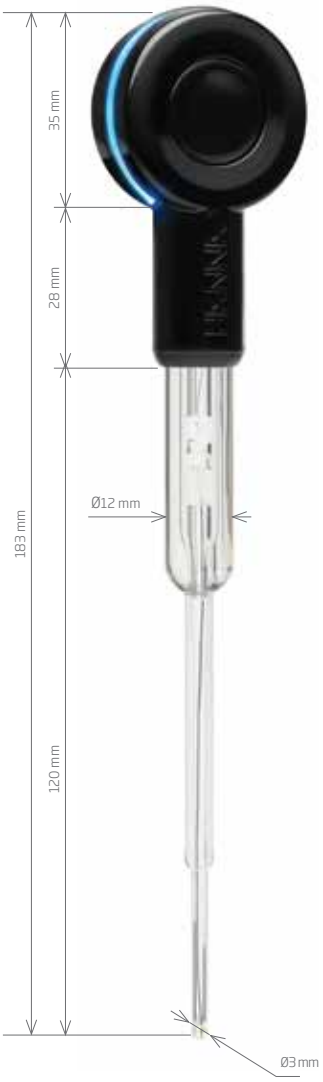
The reference half-cell has an open junction design in order to accommodate the 5 mm micro bulb and shaft. The open junction design is resistant to clogging from suspended solids and proteins found in biological samples. Any clogging that occurs will impede the measurement circuit between the indicating electrode and the internal reference resulting in slower response time and erratic readings.

Maintenance Free Gel-filled Reference

The open junction design consists of a solid gel (Viscolene) interface between the sample and internal ceramic reference junction. Other than routine calibration and cleaning, this probe is maintenance free.

HALO Specifications	HI13302
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	open junction
Electrolyte	Viscolene
Body Material	glass
Tip / Shape	spheric
Temperature Operating Range	-5 to 50°C (23 to 122°F)
Body Length/Overall Length	120 mm /183 mm
Temperature Sensor	integrated
Outer Diameter	5 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI13302** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142



HI10832

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for small sample lab applications

HI10832 HALO is an innovative, application specific, pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. This pH electrode allows for the wireless measurement of very small sample sizes for laboratory customers in university, pharmaceutical, and biotechnology research.

- Micro bulb tip
  - The 3 mm diameter bulb can measure the pH in samples as small as 100 µL.
- Open junction design
  - Resists clogging and provides for fast response time
- Gel-filled reference
  - Maintenance free with no fill solutions required

Micro Bulb Tip

HI10832 has an extremely small pH-sensing bulb that is only 3 mm in diameter. The small diameter of the probe allows for the measurement of pH in 96 well plates, test tubes and vials. The HI10832 is ideal for use with expensive samples that offer little volume to work with.

Open Junction Design

The reference half-cell has an open junction design in order to accommodate the 3 mm micro bulb and shaft. The open junction design is resistant to clogging from suspended solids and proteins found in biological samples. Any clogging that occurs will impede the measurement circuit between the indicating electrode and the internal reference resulting in slower response time and erratic readings.

Maintenance Free Gel-filled Reference

The open junction design consists of a solid gel (viscolene) interface between the sample and internal ceramic reference junction. Other than routine calibration and cleaning, this probe is maintenance free.

HALO Specifications	HI10832
Measurement Range	0.00 to 13.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	open
Electrolyte	Viscolene
Body Material	glass
Tip / Shape	spheric
Temperature Operating Range	0 to 50°C (32 to 122°F)
Body Length/Overall Length	120 mm /183 mm
Temperature Sensor	none
Outer Diameter	3 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI10832** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

HI12302

HALO®

Ideal for field applications

Compatible with:
iOS
Android™
edge®blu

HI12302 HALO is an innovative, pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. HI12302 is a general purpose, PEI plastic body pH electrode for routine measurements in the field, lab or at home.

- PEI plastic body
  - Durable, chemically resistant plastic
- Double Junction
  - Silver free outer reference that is compatible with most samples
- Built-in temperature sensor
  - High accuracy temperature compensated measurements
- Gel-filled reference
  - Maintenance free with no fill solutions required

PEI Plastic Body

The body of the HI12302 is composed of polyetherimide (PEI) resin. PEI is a high quality plastic that is chemically resistant to many aggressive chemicals making it ideal for a wide range of applications. The PEI body excels in field measurements due to its durability. The shield around the spherical glass tip also helps to minimize breakage due to accidental bumping or dropping of the electrode.

Double Junction

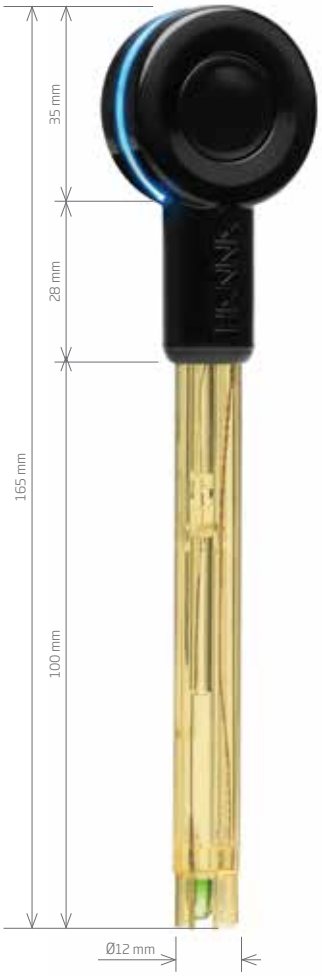
HI12302 is a double junction pH electrode in which the Ag/AgCl necessary for the reference cell is located behind an inner ceramic junction. The electrolyte between the inner and outer junction is silver free. This is important to prevent the precipitation of silver by Tris buffer, metals, and sulfides that would clog the junction leading to erratic readings.

Built-in Temperature Sensor

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

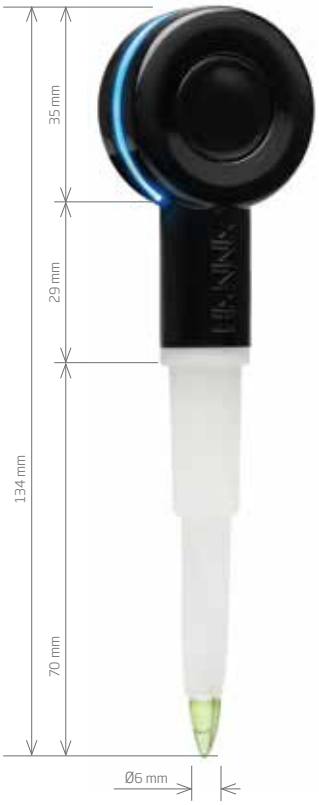
Maintenance Free Gel-filled Reference

HI12302 contains a silver free gel in the outer reference cell. There is no fill solution to replenish as the probe is used. Other than routine calibration and cleaning, this probe is maintenance free.



HALO Specifications	HI12302
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	ceramic
Electrolyte	gel
Body Material	PEI
Tip / Shape	dome
Temperature Operating Range	-5 to 70°C (23 to 158°F)
Body Length/Overall Length	100 mm / 165 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (plastic)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI12302** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142



FC2022

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for food applications

The FC2022 HALO is an innovative, application specific pH electrode with Bluetooth® Smart technology designed for food processing companies that need to monitor the pH of their product for quality and compliance.

- Conic bulb
  - Easy penetration into soft solids and semi-solids
- Low temperature glass
  - Fast and accurate measurement of refrigerated products
- Open junction
  - Resists clogging and provides fast response time
- Gel-filled reference
  - Maintenance free with no fill solutions required
- Built-in temperature sensor
  - High accuracy temperature compensated measurements

Conic Bulb

The conical shaped tip design allows for the easy penetration of the sensor into soft solids and semi-solids such as cheeses, yogurt, meats, and sauces. It doesn't trap foods and is very easy to wipe clean.

Low Temperature Glass

The glass tip is made with Low Temperature (LT) glass formulation that has a lower resistance than standard glass types used with ordinary pH electrodes. This is beneficial since many food products are stored at low temperatures. FC2022 HALO is suitable to be used for measurements between 0 to 10°C (32 to 50°F).

Open Junction Design

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

Maintenance Free Gel-filled Reference

Because the internal reference is gel, there is no fill solution to replenish as the probe is used. Other than routine calibration and cleaning, this a maintenance free probe.

Built-in Temperature Sensor

The thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature while being in the tip of the electrode allows for a rapid temperature compensated measurement.

HALO Specifications	FC2022
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	open
Electrolyte	Viscolene
Body Material	PVDF
Tip / Shape	conic
Temperature Operating Range	0 to 60°C (32 to 140°F)
Body Length/Overall Length	70 mm / 134 mm
Temperature Sensor	integrated
Outer Diameter	12 mm to 8 mm taper (plastic)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**FC2022** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142

HI10482

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for wine, must and juice

HI10482 HALO is an innovative, application specific pH electrode designed for the winemaker that needs to monitor the pH of wine, grape juice, and must.

- Clogging prevention system (CPS) technology
  - Anti-clogging PE sleeve that maintains stability and fast response
- Refillable
  - Allows the filling of the reference cell with electrolyte fill solution
- Built-in temperature sensor
  - High accuracy temperature compensated measurements
- Customized calibration buffer value
  - Calibration to pH 3.00 to bracket the expected reading in wine

CPS™
(Clogging Prevention System)

Clogging Prevention System (CPS) Technology

CPS technology is an innovation for the improvement of pH measurements in wine juice and must samples that have high solids content. Conventional pH electrodes use ceramic junctions that can clog quickly from solids found in juice and must. When the junction is clogged, the electrode does not function properly and erratic readings can result. CPS technology utilizes a ground glass junction coupled with a movable PE sleeve to prevent clogging. The ground glass allows proper flow of the liquid, while the PE sleeve repels solids. As a result, pH electrodes with CPS technology take up to 20 times longer to be fouled as compared to conventional electrodes. When the electrode becomes fouled the PE sleeve can be moved to clean the ground glass surface rejuvenating the junction and extending probe life.

Refillable

HI10482 is a refillable double junction pH electrode. Fill solution from inside the probe will diffuse through the ground glass junction while it is in use and when it is stored in storage solution. Electrolyte fill solution should be added to the probe when the level drops more than 1 cm (1/2") from the fill hole in order to maintain a good flow rate sustained by having adequate head pressure.

Built-in Temperature Sensor

HI10482 has a built-in thermistor temperature sensor that is in the tip of the pH electrode. A thermistor temperature sensor provides a high accuracy temperature reading and should be as close as possible to the indicating pH electrode in order to compensate for the effect that temperature has on the membrane potential. Having a built in temperature sensor is important in wine since the measured pH values are more than 3 pH units away from the isopotential point. The further away from the isopotential point the greater the influence that temperature has on the observed reading.

Customized Calibration Buffer Value

The average pH of wine influences the choice of calibration buffers that should be used. Generally, most wines have a finished pH between 3 and 4. To ensure a high accuracy measurement, the HI10482 will prompt for pH 3.00 buffer in place of pH 4.01. This allows the calibration to bracket the expected value to be measured.

HALO Specifications	HI10482
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	movable open junction
Electrolyte	3.5M KCl (refillable)
Body Material	glass
Tip / Shape	dome
Temperature Operating Range	0 to 80°C (32 to 176°F)
Body Length/Overall Length	120 mm / 195 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI10482** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 3.00 buffer solution, fill solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142

FC2142

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for brewers

FC2142 HALO is an innovative, application specific pH electrode designed for brewers to help monitor the pH of mash and wort.

- High temperature glass
  - Extends probe life when used with samples at elevated temperatures
- Extractable cloth junction
  - Quickly renew the junction to increase stability and extend probe life
- Built-in temperature sensor
  - High accuracy temperature compensated measurements
- Titanium body
  - Provides protection even at high temperatures as well as stability of measurement

High Temperature Glass

Standard pH glass deteriorates faster when used at high temperatures. FC2142 uses a special high temperature (HT) formulation glass that is suitable for measuring pH samples, such as with wort or mash, up to 80°C (176°F).

Extractable Cloth Junction

The advantage of the cloth junction is that it can be extracted from the probe exposing a fresh surface. This is very important since one of the major contributors to unstable measurements is a clogged junction. This is likely to occur when measuring the pH of mash that has a high solids content. Pulling out a small portion of the junction exposes a clean, unclogged portion that increases response time and extends the life of the pH electrode.

Built-in Temperature Sensor

FC2142 has a thermistor temperature sensor built into the tip of the pH electrode to provide highly accurate temperature readings and temperature compensated pH measurements.

Titanium Body

A pH measurement is a high impedance measurement, and as such is susceptible to interference from electrical noise and humidity. To overcome these issues a titanium body serves as a matching pin. A matching pin is a differential measurement technique used to eliminate electrical noise in the measurement system. The titanium body, being made of metal, is virtually unbreakable and offers additional protection from accidental breakage.

HALO Specifications	FC2142
Measurement Range	0.00 to 13.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	cloth
Electrolyte	gel
Body Material	titanium
Tip / Shape	spheric
Temperature Operating Range	0 to 80°C (32 to 176°F)
Body Length/Overall Length	120 mm / 183 mm
Temperature Sensor	integrated
Outer Diameter	12.7 mm (titanium)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**FC2142** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

HI12922

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for direct soil applications

The HI12922 HALO is an innovative, application specific pH electrode with Bluetooth® Smart technology that allows the use of a compatible Apple or Android smart device to be used as a pH meter. This electrode is designed for agricultural, hydroponics and greenhouse growers that need to monitor the pH of soil and soiless media in order to optimize plant growth.

- Conic bulb
  - Easy penetration into soft solids and semi-solids
- Triple ceramic junction
  - High flow rate for fast and stable response in slightly hydrated media
- Refillable
  - Allows the filling of the reference cell with electrolyte fill solution
- Built-in temperature sensor
  - High accuracy temperature compensated measurements

Conic Bulb

The conical shaped tip design allows for the easy penetration of the sensor into soft solids and semi-solids such as soil and soiless media. Soiless media includes hydroponics growing media including rockwool, coconut coir, and perlite.

Triple Ceramic Junction

The refillable HI12922 has three ceramic junctions in the reference cell. All pH electrodes have a reference junction that provides continuity between the internal reference wire and the sample. Utilizing a triple ceramic junction design allows for a higher flow rate of fill solution which helps provide for a fast and stable response in damp soil and soiless media.

Refillable

HI12922 is a refillable pH electrode. Fill solution from the inside will diffuse through the ceramic junctions as it is used and while stored in storage solution. Electrolyte fill solution should be added to the probe when the level drops more than 1 cm (1/2") from the fill hole in order to maintain a good flow rate sustained by having adequate head pressure (optional).

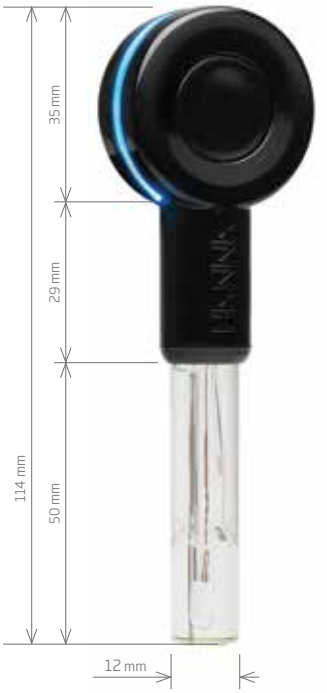
Built-in Temperature Sensor

The HI12922 has a thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature while being in the tip of the electrode allows for a rapid temperature compensated measurement.

Includes soil auger

HALO Specifications	HI12922
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	triple ceramic
Electrolyte	3.5M KCl (refillable)
Body Material	glass
Tip / Shape	conic
Temperature Operating Range	-5 to 70°C (23 to 158°F)
Body Length/Overall Length	120 mm / 195 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI12922** (HALO) is supplied with soil auger, storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, fill solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142



HI14142

HALO®

Compatible with:
iOS
Android™
edge®blu

Ideal for flat surfaces

The HI14142 HALO is an innovative pH electrode with Bluetooth® Smart technology designed for flat surfaces.

- Flat bulb
  - Measure pH on flat surfaces or small volume samples
- Low temperature glass
  - Fast and accurate measurement at lower temperatures
- Open junction
  - Resists clogging and provides fast response time
- Gel-filled reference
  - Maintenance free with no fill solutions required
- Built-in temperature sensor
  - High accuracy temperature compensated measurements

Flat Tip Bulb

The flat shaped tip design allows for easy measurement on surfaces or samples with a small volume.

Low Temperature Glass

The glass tip is made with Low Temperature (LT) glass formulation that has a lower resistance than standard glass types used with ordinary pH electrodes.

Open Junction Design

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

Maintenance Free Gel-filled Reference

Because the internal reference is gel, there is no fill solution to replenish as the probe is used. Other than routine calibration and cleaning, this a maintenance free probe.

Built-in Temperature Sensor

The thermistor temperature sensor built into the tip of the pH electrode. A thermistor based temperature sensor provides for a high accuracy temperature while being in the tip of the electrode allows for a rapid temperature compensated measurement.

HALO Specifications	HI14142
Measurement Range	0.00 to 12.00 pH
Reference Cell Type	double, Ag/AgCl
Junction Type	open
Electrolyte	Viscolene
Body Material	glass
Tip / Shape	flat
Temperature Operating Range	0 to 50°C (32 to 122°F)
Body Length/Overall Length	50 mm / 114 mm
Temperature Sensor	integrated
Outer Diameter	12 mm (glass)
Connector Type	Bluetooth Smart (Bluetooth 4.0), 10 m (33') range
Battery Type/Life	CR2032 3V lithium ion / approximately 500 hours
Environment	0 to 50°C (23 to 122°F); electronic module is not waterproof
Ordering Information	**HI14142** (HALO) is supplied with storage solution, cleaning solution, pH 7.01 buffer solution, pH 4.01 buffer solution, battery, quality certificate and instruction sheet.

pH solutions begin on page 2.142

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.

- Simply connect each probe via the 3.5 mm jack, Digital Smart Electrodes are automatically recognized
- Resolution selectable from 0.01 and 0.001 pH
- Range -2.000 to 16.000 pH
- Accuracy ±0.002 pH for 0.001 pH resolution; ±0.01 for 0.01 resolution
- Data logging
  - Manual log-on-demand
  - Manual log-on-stability
  - Interval logging
- Temperature readout (°C or °F)
- Automatic Temperature Compensation (ATC)
- CAL Check™ Indicators:
  - Probe condition
  - Response time
  - Check buffer
  - Clean electrode
- Sensor Check™ Indicators:
  - Broken electrode
  - Clogged junction
- GLP data
  - Records date, time, offset, slope and buffers used during calibration
- Five-point calibration
  - A choice of seven pre-programmed buffers plus two selectable custom buffers
- Calibration tag on screen
  - Identifies buffers used for current calibration
- Calibration expiration warning

Sleek design

Incredibly thin and lightweight, edge measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

All edge compatible pH, EC and dissolved oxygen digital probes are interchangeable with edge.

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 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†
	Temperature Compensation*	automatic, -5.0 to 100.0°C (23.0 to 212.0°F) (using integral temperature sensor)
	Electrode Diagnostics	standard mode: probe condition, response time and out of calibration range
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
Additional Specifications	Probe (included in pH kit)	HI11310 digital glass body pH electrode with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions / Weight	202 x 140 x 12 mm (7.9" x 5.5" x 0.5") / 250 g (8.82 oz.)
Ordering Information	**HI2020-01** (115V) and **HI2020-02** (230V) pH kit includes: HI11310 glass body, refillable pH electrode, 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. All edge compatible pH, EC and DO digital probes are interchangeable with HI2020 and can be ordered separately.	

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

pH and ORP solutions begin on page 2.142. edge pH digital electrodes begin on page 2.129.

3.5 mm probe input

Plugging an electrode in has never been simpler; no alignments or broken pins, simply connect the 3.5 mm plug and begin. Digital electrodes are automatically recognized.

Sleek design

Incredibly thin and lightweight, edge®pH measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

Specifications		edge pH
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†
	Temperature Compensation*	automatic, -5.0 to 100.0°C (23.0 to 212.0°F) (using integral temperature sensor)
	Electrode Diagnostics	standard mode: probe condition, response time and out of calibration range
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
ORP	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV (±999.9 mV); ±1 mV (±2000 mV)
	Calibration	one-point calibration
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
Additional Specifications	Probe	HI11310 digital glass body pH electrode with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information	**HI2002-01** (115V) and **HI2002-02** (230V) edge pH includes: HI11310 glass body, refillable pH electrode, pH 4 buffer solution sachets (4), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2), 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.	

Specifications		HI5222
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
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C/-4.0 to 248.0°/253.15 to 393.15K
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
	Relative mV Offset Range	±2000 mV
ISE	Range	1 x 10 ^{6} to 9.99 x 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
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-W stainless steel temperature probe with 1 m (3.3') cable (included)
	Input Channel(s)	2 pH/ORP/ISE
	GLP	calibration points, calibration time stamp, probe offset, slope, date, time and buffers/standards used
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points/channel; **interval:** 14 selectable between 1 second and 180 minutes; **type:** automatic, manual, AutoHOLD;
	Display	color graphic LCD 240x340 pixels
	PC Connection	USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions	160 x 231 x 94 mm (6.3 x 9.1 x 3.7")
	Weight	1.2 kg (2.64 lbs.)
Ordering Information		**HI5222-01** (115V) and **HI5222-02** (230V) are supplied with HI1131B pH electrode, HI7662-W 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.

Customizable User Interface

The user interface of the HI5221 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 HI5221 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 HI5221 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.

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.

GLP Data

HI5221 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, buffers /standards used for calibration and slope characteristics. The offset is also displayed for pH electrodes.

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.

Data Logging

Three selectable logging modes are available on the HI5221: 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.

Specifications		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
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C/-4.0 to 248.0°/253.15 to 393.15K
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
	Relative mV Offset Range	±2000 mV
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
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-W stainless steel temperature probe with 1 m (3.3') cable (included)
	Input Channel(s)	1 pH/ORP
	GLP	calibration points, calibration time stamp, probe offset, slope, date, time and buffers/standards used
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points/channel; **interval:** 14 selectable between 1 second and 180 minutes; **type:** automatic, manual, AutoHOLD;
	Display	color graphic LCD 240x340 pixels
	PC Connection	USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions	160 x 231 x 94 mm (6.3 x 9.1 x 3.7")
	Weight	1.2 kg (2.64 lbs.)
Ordering Information	**HI5221-01** (115V) and **HI5221-02** (230V) are supplied with HI1131B pH electrode, HI7662-W 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.	

Built-in Impact Printer

The built-in impact printer incorporated into the HI122 uses regular paper that does not fade with time. The information related to measurements being taken can be printed while in measurement mode, GLP or Setup mode. This meter also allows users to print detailed information in four languages for specific help screens and instrument set-up.

Secondary keypad

Built-in impact printer

Specifications		HI122
pH	Range	-2.00 to 16.00 pH; -2.000 to 16.000 pH
	Resolution	0.01 pH; 0.001 pH
	Accuracy @25°C	±0.01 pH; ±0.002 pH
	Calibration	automatic, up to five point calibration standard with seven buffers (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and two custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120°C (-4.0 to 248.0°F)
mV	Range	±999.9; ±2000 mV
	Resolution	0.1 mV; 1 mV
	Accuracy @25°C	±0.2 mV (±699.9 mV); ±0.5 mV (±999.9 mV); ±1 mV (±2000 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 @25°C	±0.4°C (±0.7°F)
Additional Specifications	pH Electrode	HI1131P glass body pH electrode with BNC + pin connectors and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T temperature probe with 1 m (3.3') cable (included)
	Log-on-demand	50 samples (25 per channel)
	Interval Logging	5 second to 180 minutes, 1000 samples (500 per channel)
	Input Impedance	10^{12} Ohm
	PC Connection	RS232 serial port, opto-isolated
	Printer	built-in dot matrix printer, with 44 mm plain paper
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions	280 x 203 x 84 mm (11.0 x 8.0 x 3.3")
	Weight	1.9 kg (4.2 lbs.)
Ordering Information	**HI122-01** (115V) and **HI122-02** (230V) are supplied with HI1131P pH electrode, HI7662-T temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI7082 3.5M KCL electrolyte solution (30 mL), (5) paper rolls, 12 VDC adapter and instructions.	

HI2221

Benchtop pH/mV Meter

with CAL Check™ Electrode Diagnostics

The HI2221 pH/mV benchtop meter features CAL Check, data logging capability, and USB port for computer connectivity. Readings for pH can be manually or automatically compensated for temperature variations with the separate HI7662 temperature probe from -20.0 to 120.0°C.

CAL Check

Hanna's exclusive CAL Check diagnostics system ensures accurate pH readings every time by alerting users of potential problems during the calibration process. The CAL Check system eliminates erroneous readings due to dirty or faulty pH electrodes or contaminated pH buffer solutions during calibration. After the guided calibration process, the probe condition is evaluated and an indicator is displayed informing the user of the overall pH electrode status.

Automatic Calibration

Automatic pH calibration can be performed at up to 5 points using 7 standard buffers (1.68, 4.01, 6.86, 7.01, 9.18,10.01, and 12.45).

GLP Data

The calibration data for each channel including date, time, standards used, offset, and slope can be accessed when the instrument is in pH measuring mode.

HI1131P pH Electrode

The HI2221 is supplied with the HI1131P glass body, double junction, refillable pH electrode with a BNC and pin connector. This design consideration is ideal for laboratory samples, liquid samples, and high temperature samples, as well as general purpose use.

mV mode

HI2221 has a mV mode that can be used with ORP electrodes and for relative mV readings.

Data Logging

The log-on-demand feature allows up to 100 data points to be recorded.

Data Transfer

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

Specifications		HI2221
pH	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH
	pH Calibration	automatic, up to five point calibration with seven standard buffer available (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45)
	Temperature Compensation	Manual or Automatic from -20.0 to 120.0°C (-4.0 to 248.0°F)
mV	Range	±699.9 mV; ±2000 mV
	Resolution	0.1 mV (±699.9 mV); 1 mV (±2000 mV)
	Accuracy	±0.2 mV (±699.9 mV); ±1 mV (±2000 mV)
Temperature	Range	-20.0 to 120.0°C (-4.0 to 248.0°F)
	Resolution	0.1°C
	Accuracy	±0.2°C (Excluding probe error)
Additional Specifications	pH Electrode	HI1131P glass body pH electrode with BNC + Pin connector and 1 m (3.3') cable (included)
	Logging Memory	log-on-demand up to 100 records
	Input Impedance	10^{12} Ohm
	Connectivity	opto-isolated USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions / Weight	235 x 222 x 109 mm (9.2 x 8.7 x 4.3") / 1.3 Kg (2.9 lb)
Ordering Information	**HI2221-01** (115V) and **HI2221-02** (230V) are supplied with HI1131P pH electrode, HI7662 temperature probe, HI76404N electrode holder, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI7082S electrolyte solution, HI700661 cleaning solution sachet, 12 VDC adapter, and instructions.	

HI2210 · HI2211

pH Benchtop Meters

- Automatic temperature compensation (ATC)
- Two-point calibration
- Simple to operate
- Reading stability indicator
- Measurement recall

The HI2211 and HI2210 are accurate and affordable benchtop pH and °C meters. The HI2211 can also be used to measure Oxidation Reduction Potential (ORP) in the mV range.

The calibration process is guided step-by-step through graphics shown on the LCD.

Designed to be easy to use, these instruments also feature a reading stability indicator used during calibration and a measurement recall function .

pH measurements for both instruments are compensated for the temperature effect manually or automatically with the HI7662 temperature probe. These instruments are also equipped with an easy-to-read LCD which shows both the primary reading and °C.

Specifications		HI2210	HI2211
pH	Range	-2.00 to 16.00 pH	-2.00 to 16.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01 pH	±0.01 pH
	pH Calibration	automatic, one or two-point with five memorized buffer values (pH 4.01, 6.86, 7.01, 9.18, 10.01)	
	Temperature Compensation	automatic (with HI7662 probe) or manual from -20.0 to 120.0°C	
mV	Range	–	±399.9 mV ; ±2000 mV
	Resolution	–	0.1 mV; 1 mV
	Accuracy	–	±0.2 mV (±399.9 mV); ±1 mV (±2000 mV)
Temperature	Range	-20.0 to 120.0°C (-4 to 248.0°F)	
	Resolution	0.1°C	0.1°C
	Accuracy	±0.4°C (excluding probe error)	
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)	
	Temperature Probe	HI7662 stainless steel temperature probe with 1 m (3.3') cable (included)	
	Input Impedance	10^{12} Ohm	
	Power Supply	12 VDC adapter (included)	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions / Weight	235 x 222 x 109 mm (9.2 x 8.7 x 4.3"); 1.3 Kg (2.9 lbs)	
Ordering Information	**HI2210-01** (115V), **HI2210-02** (230V), **HI2211-01** (115V) and **HI2211-02** (230V) are supplied with HI1131B pH electrode, HI7662 temperature probe, HI76404N electrode holder, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI7082 3.5M KCl electrolyte solution (30 mL), HI700601 cleaning solution sachet, 12 VDC adapter and instructions.		

HI2209 · HI22091

pH Benchtop Meters

with Manual Temperature Compensation and Analog Output

- Manual pH calibration
  - This simple to use feature provides the ability to demonstrate the concept of offset and slope. It can be calibrated to any value within the measurement ranges and is less expensive than models with automatic calibration
- Manual temperature compensation (MTC)
  - MTC provides the ability to demonstrate the effect of temperature on pH measurement. It is simple to use and allows for different temperature corrections based on the sample being tested.
- Analog output (HI22091 only)
  - Allows a recording device to be connected to the meter.
- mV range
  - These pH/mV meters can also measure ORP (oxidation reduction potential) or ion concentration (ISE) in the extended mV range with optional electrodes.
- Large LCD
  - The new, larger LCD is bright and easy to read.
- Built-in solution holders
  - These meters have solution holders built into the casing. This convenient feature saves space and prevents solutions from tipping over

The HI22091 pH/mV Meter with manual temperature compensation (MTC) and analog output provides a simple to use, cost effective method of measuring pH. The HI22091 features a large, easy to read LCD and built-in solution holders. HI2209 has all the features of the HI22091 with the exception of analog output.

In order to achieve maximum accuracy, the HI22091 and HI2209 feature manual pH calibration at one or two points. Manual calibration enables the user to select the instrument's calibration points closer to the desired range of measurement, making them ideal for applications that require custom calibration points. (In some applications, a standard calibration curve such as pH 7 or pH 4 is too far from the value of the sample to achieve the highest accuracy.

Specifications		HI2209	HI22091
pH	Range	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01 pH	±0.01 pH
	Calibration	manual, one or two-point	manual, one or two-point
	Temperature Compensation	manual from 0 to 100°C (32 to 212°F)	
mV	Range	±1999 mV	±1999 mV
	Resolution	1 mV	1 mV
	Accuracy	±1 mV	±1 mV
Additional Specifications	pH Electrode	HI1332B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)	
	Input Impedance	10^{12} Ohm	10^{12} Ohm
	Analog Output	–	0 to 5 V according with: 0 to 14 pH or -1999 to +1999 mV, temperature: always 0
	Power Supply	12 VDC adapter (included)	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions / Weight	235 x 222 x 109 mm (9.2 x 8.7 x 4.3") / 1.3 kg (2.9 lbs.)	
Ordering Information		**HI2209-01** (115V), **HI2209-02** (230V), **HI22091-01** (115V) and **HI22091-02** (230V) are supplied with HI1332B pH electrode, 12 VDC adapter and instruction manual.	

HI208

Educational pH Meter

- Simple User Interface
  - Operation is simple with limited features that only require the use of a couple of buttons and readings are easy to view on the dual-level display.
- Built-in Stir Bar
  - Integrated 500 rpm magnetic stirrer.
- One or Two-Point Calibration
  - Automatic calibration can be performed at 1 or 2 points with a choice of two sets of preprogrammed buffers (pH 4.01, 7.01, 10.01 or 4.01, 6.86, 9.18).
- HI1291D pH Electrode
  - The HI208 is supplied with the HI1291D PEI body, single junction, refillable pH electrode with an internal temperature sensor and DIN connector.
- Temperature Compensation
  - The HI208 offers automatic temperature compensation of pH measurements over a wide range from -5.0 to 105.0°C.
- Stability Indicator
  - The HI208 features a stability indicator. A clock icon appears on the display when there is instability in the reading. The clock icon disappears once the reading has stabilized. At that time a reading should be taken or stored.

Specifications		HI208
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	automatic, one or two-point with two sets of memorized buffer values (pH 4.01, 7.01, 10.01 or 4.01, 6.86, 9.18)
	Temperature Compensation	automatic
Temperature*	Range	-5.0 to 105.0°C; 23.0 to 221.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5 (up to 60°C); ±1°C (outside); ±1°F (up to 140°F); ±2°F (outside)
Additional Specifications	pH Electrode	HI1291D amplified PEI body pH electrode with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Stirrer	Built-in magnetic stirrer at 500 rpm
	Power Supply	12 VDC adapter or 9V battery
	Battery Life	approximately 200 hours without stirrer
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions / Weight	192 x 104 x 134 mm (7.6 x 4.1 x 5.3") / 420 g (14.8 oz.)
Ordering Information		**HI208-01** (115V) and **HI208-02** (230V) are supplied with HI1291D pH electrode, pH electrode holder and plastic beaker, rubber O-ring, magnetic stir bar, pH 4.01 buffer solution sachet, pH 7.01 buffer solution sachet, electrode cleaning solution sachet for agriculture, 12 VDC adapter, battery and instructions.

* temperature range is limited to 80°C (176 °F) if using HI 1291D probe.

The HI208 is a basic affordable pH benchtop meter ideal for educational purposes. Operation is simplified with automatic pH calibration and automatic temperature compensation. This meter also features a built-in 500 rpm magnetic stirrer, extended pH range, dual-level LCD with icons for stability and buffer recognition, and temperature display in either Celsius or Fahrenheit.

The HI208 can be calibrated to 1 or 2 points with a choice of two sets of preprogrammed buffers (pH 4.01, 7.01, 10.01 or 4.01, 6.86, 9.18). The HI208 also utilizes the HI1291D two-in-one pH and temperature probe which allows for automatic temperature compensation with accuracy of ±0.5°C (up to 60°C).

The compact design of the HI208, makes it ideal for educational use by reducing clutter and utilizing a minimal amount of space on the desktop. The option to switch to battery power also allows the meter to be taken outside the classroom for field studies.

HI98190

Professional Waterproof Meter

pH/ORP

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers available
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- AutoHold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Most of the available options such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is supplied complete with sensor, calibration solution, beakers, PC software and connection cable, instruction manual, quick start guide and batteries in a rugged, custom carrying case.

Designed for professionals

The HI98190 is a rugged, portable pH meter with the performance and features of a benchtop meter. Exchange out the pH probe for an ORP probe to obtain mV readings in the ±2000 mV range. This professional, waterproof meter can easily be operated with one hand and complies with IP67 standards. The HI98190 is supplied with all necessary accessories to perform a pH/temperature measurement packaged into a durable carrying case.

Backlit Graphic LCD Display

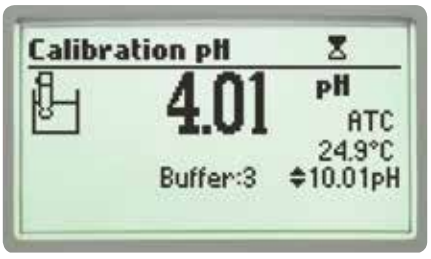
The HI98190 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

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. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Probe

The HI98190 features the HI12963 titanium bodied pH/temperature electrode with a quick connect DIN connector to make attaching and removing the probe simple and easy.

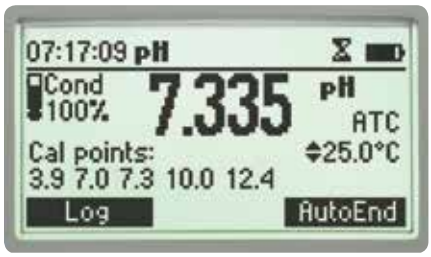


pH Calibration

Choose from seven standard pH buffers and five custom pH buffers to obtain up to five point calibration and achieve high precision readings with a pH accuracy of ±0.002 and up to ±0.001 pH resolution.

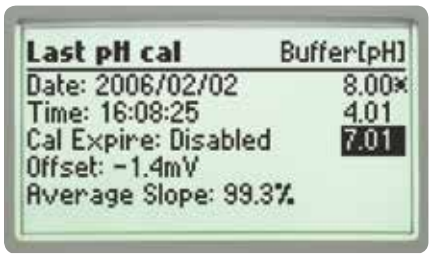
Enhanced Calibration

An "out of calibration range" warning can be engaged to keep the user informed of the current calibration and help to avoid performing measurements that are out of range.



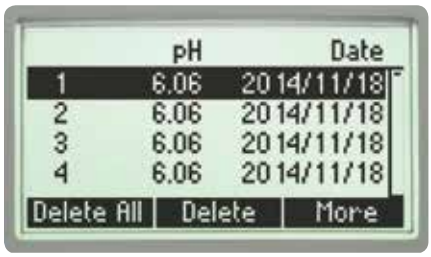
CAL Check™

Hanna's CAL Check maintains a history of past calibrations and monitors the pH electrode and buffers during subsequent calibrations for any signs of wide variances due to a dirty or broken electrode or contaminated pH buffers. During calibration, users are alerted to problems should they occur. After calibration, the electrode's overall condition is displayed as a percentage.



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.



Data Logging

The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

AutoHold

Pressing AutoHold during measurement will automatically hold the first stable reading on the display.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

Calibration Error Messages

Calibration is successfully performed if the reading is within certain limits.

Wrong Buffer – The pH reading is not within range of the selected buffer.

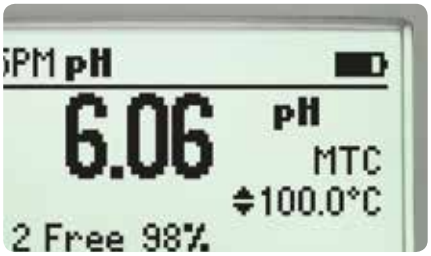
Electrode Dirty/Broken alternatively with

Buffer Contaminated –The offset of the electrode is not in the accepted range. Check if the electrode is broken or clean it following the Cleaning Procedure at the end of this section. Check the quality of the buffer. If necessary, change the buffer.

Wrong or Wrong Old Slope – An inconsistency between new and previous (old) calibration is detected.

PC Connectivity

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



Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

The HI98190 meter, probe, and all accessories are supplied in the HI720190 rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

HI12963 pH Electrode

- Titanium body
  - Titanium construction provides an unbreakable structure and allows the transfer of heat to the internal temperature sensor for rapid temperature compensation.
- Maintenance free, gel-filled electrode
  - No fill solution required.

Calibrate right in the case with custom beaker holders

Our custom carrying case features beaker holders for calibration out in the field.

Specifications		HI98190
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)
Additional Specifications	pH Probe	HI12963 titanium body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	200 samples (100 each pH/mV range)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	**HI98190** is supplied with HI12963 pH electrode, HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), electrode cleaning solution sachet (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 an HI720190 rugged carrying case with custom insert.	

* Limits will be reduced to actual sensor limits

HI98161

pH / Temperature Meter for Food

HI98161 is a professional portable pH and temperature meter with a probe designed specifically for pH measurement in the Food sector.

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- Auto hold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Important and often used functions such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is 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

Auto Hold

Pressing AutoEnd during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

PC Connectivity

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

Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

Each meter is 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. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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)
Additional Specifications	pH Probe	FC2023 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	Up to 200 samples (100 pH, 100 mV)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
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.

FC2023

pH / Temperature Probe for Food

When measuring pH, food products can pose a number of challenges. Samples can vary in consistency from solid, semi-solid to a slurry with a high content of solids. These sample types can coat the sensitive glass membrane surface and/or clog the reference junction. Designed specifically for measuring pH in food, the FC2023 has a conic tip shape for easy penetration, an open junction to resist clogging, and a PVDF food grade plastic body that can be cleaned with sodium hypochlorite. The FC2023 is an ideal general purpose pH electrode for use in food manufacturing.

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.

Low temperature glass

The FC2023 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 FC2023 is suitable to use with samples that measure from 0 to 50°C.

Open junction reference

Clogging of the reference junction is a common challenge faced by food producers that measure pH in slurries and semi-solid products. The solids can easily clog the ceramic junction used with standard laboratory pH electrodes. The open junction design of the FC2023 resists clogging and continues to provide accurate, stable readings.

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.

Conic tip shape

This design allows for penetration into semisolids and emulsions for the direct measurement of pH in a variety of food products including sauces, dough, and other semi-solids.

Built-in temperature sensor

A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

Specifications	FC2023
Description	pre-amplified pH/temperature probe
Reference	single, Ag/AgCl
Junction	open
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F) - LT
Tip /Shape	conic (dia: 6 x 10 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	PVDF
Cable	coaxial; 1 m (3.3')
Connection	quick connect DIN

Application Importance

One of the most common measurements of food products is pH because of how it affects food characteristics such as shelf stability, texture, and flavor. Foods are generally broken into two groups based on their pH value. These groups include acid foods which have a naturally low pH of 4.6 or below and low-acid foods that have a finished equilibrium pH value greater than pH 4.6 and a water activity greater than 0.85. The low-acid foods can be pH adjusted with the addition of an acid to lower the final pH and become an acidified food.

In food processing, some products require the measurement of pH to meet industry regulations to ensure the quality and safety of goods. A lower pH will help in preventing unwanted bacteria from growing thus extending the shelf life of a product. While food safety is a crucial consideration, understanding the pH of a food product can also help to achieve consistent flavors and textures. Through fermentation and other biological processes, many foodstuffs only achieve their desired qualities at particular pH values or ranges. pH is an essential parameter that requires close observation throughout food production to provide the best possible product.

HI98162

pH / Temperature Meter for Milk

HI98162 is a professional portable pH and temperature meter with a probe designed specifically for pH measurement in milk.

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- Auto hold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Important and often used functions such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is 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

Milk pH Meter

designed for food professionals

Hanna food quality pH meters are rugged and portable with the performance and features of a benchtop. Five models are available in this series to measure food, milk, meat, yogurt and cheese. Each model is supplied with an application specific electrode and cleaning solutions. These waterproof meters comply to IP67 standards and can be easily operated with one hand.

Backlit Graphic LCD Display

These meters feature 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

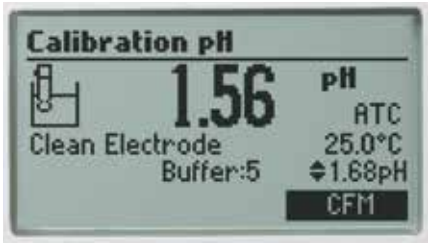
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick Connect Probe

Each meter features an application specific pH/temperature probe with a quick connect DIN connector to make attaching and removing the probe simple and easy.

Calibration Timeout

Alerts when calibration is due at a specified interval.



pH Calibration

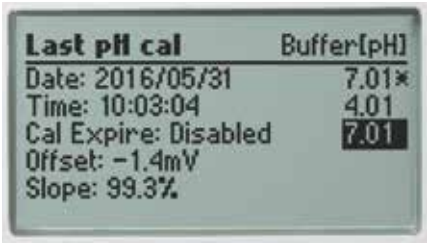
Choose from seven standard pH buffers and five custom values to obtain up to five point calibration and achieve high precision readings with a 0.001 pH resolution and a pH accuracy of ±0.002.

Enhanced Calibration

An "out of calibration range" warning can be engaged to keep the user informed of the current calibration and help to avoid performing measurements that are out of the bracketed range.

CAL Check™

Hanna's CAL Check maintains a history of past calibrations and monitors the pH electrode and buffers during subsequent calibrations for any signs of wide variances due to a dirty or broken electrode or contaminated pH buffers. During calibration, users are alerted to problems should they occur. After calibration, the electrode's overall condition is displayed as a percentage.



GLP

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

Data Logging

The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

Automatic Temperature Compensation

pH sensors incorporate a built-in temperature sensor in the tip of the electrode for a fast and accurate temperature compensated value.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for many important and often used functions. These meters also feature two virtual soft keys that navigate the user through setup and logging of data. The interface is intuitive for any user's level of experience.

Auto Hold

Pressing AutoEnd during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

PC Connectivity

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

Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

Each meter is 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. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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
	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)
Additional Specifications	pH Probe	FC1013 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	Up to 200 samples (100 pH, 100 mV)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
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.

FC1013

pH / Temperature Probe for Milk

The FC1013 pH electrode has a built-in temperature sensor for simultaneous temperature compensated pH and temperature readings, and also contains an integral pH sensor preamplifier to provide measurements impervious to noise and electrical interferences.

FC1013 electrode is designed to prevent the typical problems of clogging in viscous and proteinaceous liquids ensuring a fast response and stable reading.

PVDF body

The FC1013 is composed of food grade PVDF plastic. This material is highly durable and chemically resistant.

General purpose glass

The FC1013 uses general purpose (GP) glass. The formulation allows for fast response over a wide range of temperatures. The FC1013 is suitable to use with samples that measure from 0 to 80°C.

Refillable electrolyte

The silver-free electrolyte ensures no silver precipitate can clog the junction. An easy to use fill cap allows for quick refilling of electrolyte solution to maintain adequate head pressure.

Single ceramic junction

A porous ceramic frit allows the silver-free electrolyte to flow slowly into solution, providing accurate readings for aqueous samples.

Spheric tip shape

The shape of the sensing membrane provides a large surface area for contact with milk samples. The highly durable construction provides accurate measurements on the dairy farm as well as the production facility.

Built-in temperature sensor

A thermistor temperature sensor is in the tip of the indicating pH bulb. A temperature sensor should be as close as possible to the indicating pH electrode in order to compensate for variations in temperature.

Specifications	FC1013
Description	pre-amplified pH/ temperature probe
Reference	double, Ag/AgCl
Junction	ceramic, single
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temperature	0 to 80°C (32 to 176°F) - GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	PVDF
Cable	coaxial; 1 m (3.3')
Connection	quick connect DIN

Application Importance

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 measurements are 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 infected with mastitis. 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.

HI98163

pH / Temperature Meter for Meat

HI98163 is a professional portable pH and temperature meter with a probe designed specifically for pH measurement in meat.

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- Auto hold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Important and often used functions such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is 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

Meat pH Meter

designed for food professionals

Hanna food quality pH meters are rugged and portable with the performance and features of a benchtop. Five models are available in this series to measure food, milk, meat, yogurt and cheese. Each model is supplied with an application specific electrode and cleaning solutions. These waterproof meters comply to IP67 standards and can be easily operated with one hand.

Backlit Graphic LCD Display

These meters feature 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

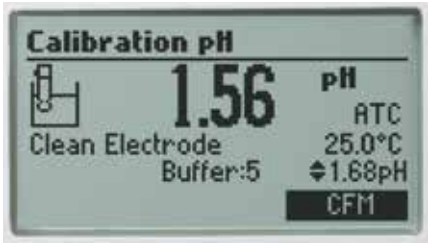
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick Connect Probe

Each meter features an application specific pH/temperature probe with a quick connect DIN connector to make attaching and removing the probe simple and easy.

Calibration Timeout

Alerts when calibration is due at a specified interval.



pH Calibration

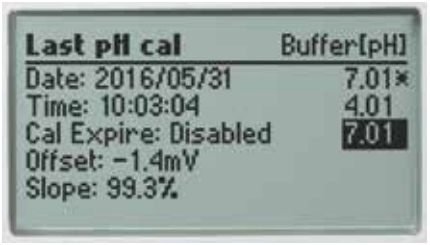
Choose from seven standard pH buffers and five custom values to obtain up to five point calibration and achieve high precision readings with a 0.001 pH resolution and a pH accuracy of ±0.002.

Enhanced Calibration

An "out of calibration range" warning can be engaged to keep the user informed of the current calibration and help to avoid performing measurements that are out of the bracketed range.

CAL Check™

Hanna's CAL Check maintains a history of past calibrations and monitors the pH electrode and buffers during subsequent calibrations for any signs of wide variances due to a dirty or broken electrode or contaminated pH buffers. During calibration, users are alerted to problems should they occur. After calibration, the electrode's overall condition is displayed as a percentage.



GLP

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

Data Logging

The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

Automatic Temperature Compensation

pH sensors incorporate a built-in temperature sensor in the tip of the electrode for a fast and accurate temperature compensated value.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for many important and often used functions. These meters also feature two virtual soft keys that navigate the user through setup and logging of data. The interface is intuitive for any user's level of experience.

Auto Hold

Pressing AutoEnd during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

PC Connectivity

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

Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

Each meter is 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. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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)
Additional Specifications	pH Probe	FC2323 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	Up to 200 samples (100 pH, 100 mV)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
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.

FC2323

pH / Temperature Probe for Meat

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

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.

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.

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.

Low temperature glass

The FC2023 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 FC2023 is suitable to use with samples that measure from 0 to 50°C.

Built-in temperature sensor

A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

Conic tip shape

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

Specifications	FC2323
Description	pre-amplified pH/ temperature probe
Reference	single, Ag/AgCl
Junction	open
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F) - LT
Tip /Shape	conic (dia: 6 x 10 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	PVDF
Cable	coaxial; 1 m (3.3')
Connection	quick connect DIN

Application Importance

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.

HI98164

pH / Temperature Meter for Yogurt

HI98164 is a professional portable pH and temperature meter with a probe designed specifically for pH measurement in yogurt.

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- Auto hold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Important and often used functions such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is 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

Yogurt pH Meter

designed for food professionals

Hanna food quality pH meters are rugged and portable with the performance and features of a benchtop. Five models are available in this series to measure food, milk, meat, yogurt and cheese. Each model is supplied with an application specific electrode and cleaning solutions. These waterproof meters comply to IP67 standards and can be easily operated with one hand.

Backlit Graphic LCD Display

These meters feature 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

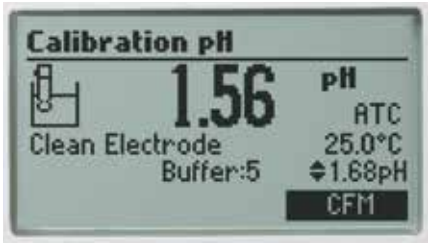
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick Connect Probe

Each meter features an application specific pH/temperature probe with a quick connect DIN connector to make attaching and removing the probe simple and easy.

Calibration Timeout

Alerts when calibration is due at a specified interval.



pH Calibration

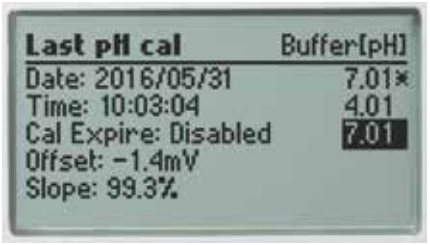
Choose from seven standard pH buffers and five custom values to obtain up to five point calibration and achieve high precision readings with a 0.001 pH resolution and a pH accuracy of ±0.002.

Enhanced Calibration

An "out of calibration range" warning can be engaged to keep the user informed of the current calibration and help to avoid performing measurements that are out of the bracketed range.

CAL Check™

Hanna's CAL Check maintains a history of past calibrations and monitors the pH electrode and buffers during subsequent calibrations for any signs of wide variances due to a dirty or broken electrode or contaminated pH buffers. During calibration, users are alerted to problems should they occur. After calibration, the electrode's overall condition is displayed as a percentage.



GLP

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

Data Logging

The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

Automatic Temperature Compensation

pH sensors incorporate a built-in temperature sensor in the tip of the electrode for a fast and accurate temperature compensated value.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for many important and often used functions. These meters also feature two virtual soft keys that navigate the user through setup and logging of data. The interface is intuitive for any user's level of experience.

Auto Hold

Pressing AutoEnd during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

PC Connectivity

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

Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

Each meter is 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. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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
	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)
Additional Specifications	pH Probe	FC2133 glass body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	Up to 200 samples (100 pH, 100 mV)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
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.

FC2133

pH / Temperature Probe for Yogurt

The FC2133 pH electrode is rugged and easy to clean with a conical tip and built-in temperature sensor. 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 after measurements in semi-solid or viscous samples. FC2133 electrode is designed to prevent the typical problems of clogging in viscous liquids, ensuring a fast response and stable reading.

Glass body

The glass body of the FC2133 allows standards and samples to more quickly reach thermal equilibrium while also providing chemical resistance.

Low temperature glass

The FC2133 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 FC2133 is suitable to use with samples that measure from 0 to 50°C.

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 yogurt and is maintenance-free.

Open junction reference

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 resists clogging and continues to provide accurate, stable readings.

Conic tip shape

This design allows for penetration into semisolids and emulsions for the direct measurement of pH in yogurt products.

Built-in temperature sensor

A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

Specifications	FC2133
Description	pre-amplified pH / temperature probe
Reference	double, Ag/AgCl
Junction	open
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F)
Tip /Shape	conic
Temperature Sensor	yes
Amplifier	yes
Body Material	glass
Cable	coaxial; 1 m (3.3')
Connection	quick connect DIN

Application Importance

Monitoring pH is crucial in producing consistent, quality yogurt. Yogurt is made by the fermentation of milk with live bacterial cultures. Following pasteurization and compositional adjustment, milk is homogenized for a consistent texture, heated to the desired thickness, and cooled before inoculation. Most yogurt is 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. As lactic acid is produced, there is a correlating drop in pH. Due to the more acidic mixture, the casein protein in milk coagulates and precipitates out, thickening the milk into a yogurt-like texture.

Yogurt producers cease incubation once a specific pH level is reached. Most producers have a set point between pH 4.0 and 4.6 in which fermentation is stopped by rapid cooling. The amount of lactic acid present at this pH level is ideal 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 is the separation of liquid, in this case whey, from the milk solids; this can occur if fermentation is stopped too early or too late, resulting in yogurt that is respectively too alkaline or too acidic. Consumers expect yogurt to remain texturally consistent, so ensuring fermentation is stopped at the appropriate pH is vital to consumer perception.

HI98165

pH / Temperature Meter for Cheese

HI98165 is a professional portable pH and temperature meter with a probe designed specifically for pH measurement in cheese.

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
  - pH sensors incorporate a built-in temperature sensor
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers
- Approximately 200 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- Auto hold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Important and often used functions such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is 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

Cheese pH Meter

designed for food professionals

Hanna food quality pH meters are rugged and portable with the performance and features of a benchtop. Five models are available in this series to measure food, milk, meat, yogurt and cheese. Each model is supplied with an application specific electrode and cleaning solutions. These waterproof meters comply to IP67 standards and can be easily operated with one hand.

Backlit Graphic LCD Display

These meters feature 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

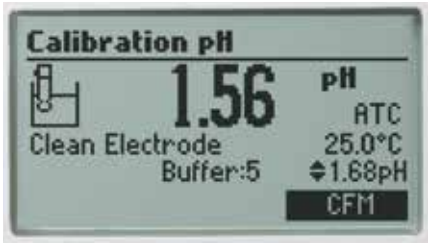
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick Connect Probe

Each meter features an application specific pH/temperature probe with a quick connect DIN connector to make attaching and removing the probe simple and easy.

Calibration Timeout

Alerts when calibration is due at a specified interval.



pH Calibration

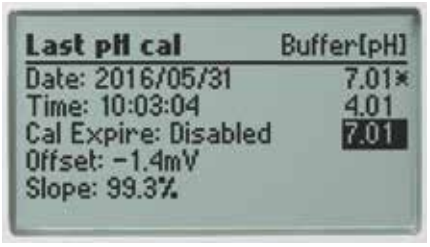
Choose from seven standard pH buffers and five custom values to obtain up to five point calibration and achieve high precision readings with a 0.001 pH resolution and a pH accuracy of ±0.002.

Enhanced Calibration

An "out of calibration range" warning can be engaged to keep the user informed of the current calibration and help to avoid performing measurements that are out of the bracketed range.

CAL Check™

Hanna's CAL Check maintains a history of past calibrations and monitors the pH electrode and buffers during subsequent calibrations for any signs of wide variances due to a dirty or broken electrode or contaminated pH buffers. During calibration, users are alerted to problems should they occur. After calibration, the electrode's overall condition is displayed as a percentage.



GLP

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

Data Logging

The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

Automatic Temperature Compensation

pH sensors incorporate a built-in temperature sensor in the tip of the electrode for a fast and accurate temperature compensated value.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for many important and often used functions. These meters also feature two virtual soft keys that navigate the user through setup and logging of data. The interface is intuitive for any user's level of experience.

Auto Hold

Pressing AutoEnd during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

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.

Setup Screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides.

PC Connectivity

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

Long Battery Life

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

Supplied Complete in a Rugged Custom Carrying Case

Each meter is 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. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

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
	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)
Additional Specifications	pH Probe	FC2423 pre-amplified pH and temperature probe with stainless steel sheath, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)
	Slope Calibration	from 80 to 110%
	Log-on-demand	Up to 200 samples (100 pH, 100 mV)
	PC Connection	opto-isolated USB with HI92000 software and micro USB cable
	Input Impedance	10^{12} Ω
	Battery Type / Life	1.5V AA batteries (4) / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
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.

FC2423

pH / Temperature Probe for Cheese

FC2423 electrode has a stainless steel sheath and conical tip to ensure quick, easy measurements and fast response. FC2423 pH electrode features a built-in temperature sensor and is ideal for measurements in semi-solid samples such as cheeses.

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.

AISI 316 stainless steel body

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

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 cheese products and is maintenance-free.

Built-in temperature sensor

A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

Conic tip shape

This design allows for penetration into solids, semi solids, and emulsions for the direct measurement of pH in cheese products.

Specifications	FC2423
Description	pre-amplified pH / temperature probe
Reference	single, Ag/AgCl
Junction	open
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F)
Tip /Shape	conic
Temperature Sensor	yes
Amplifier	yes
Body Material	AISI 316 stainless steel
Cable	coaxial; 1 m (3.3')
Connection	quick connect DIN

Application Importance

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, lowering the pH of the milk. 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.

The next stages of milling and salting are affected by pH as well. During milling, curds are cut into smaller pieces to prepare the cheese for salting. Curds with a lower pH at milling result in a harder cheese. A low pH will also result in higher salt absorption during the salting stage.

When curds are pressed into a final, solid form, the pH directly affects how well the curds fuse together. If the pH is too high during pressing, the curds will not bind together as well and the final cheese will have a more open texture.

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 characteristics like 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.

HI9126

Portable pH/mV Meter

- CAL Check™
  - Alerts users of calibration status
- Backlight
  - Backlit, multi-level LCD display
- Battery Error Prevention System (BEPS)
  - Automatically shuts off meter when battery is too low to take accurate readings
- Battery indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI9126 includes Hanna's exclusive CAL Check technology. CAL Check monitors the pH bulb every time the instrument is calibrated. In the event of a dirty pH electrode, CAL Check warns users that maintenance may be needed.

Calibrated buffers are continuously displayed in measurement mode to remind users of the instrument's calibration point. Users can easily determine if readings are taken too far outside the calibration range.

The HI9126 can store and recall a reading at the touch of a button and features a real-time clock.

HI9126 utilizes the HI1230B double junction pH electrode. The double junction design helps to minimize junction contamination for consistently accurate results. The HI9126 can also measure ORP in the mV range using an optional ORP probe.

Specifications		HI9126
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH
	Calibration	automatic, one or two-point with seven standard buffers available (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45) and two custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)
mV	Range	±699.9 mV; ±1999 mV
	Resolution	0.1 mV; 1 mV
	Accuracy	±0.2 mV; ±1 mV
Temperature*	Range	-20.0 to 120.0°C; -4.0°F to 248.0°F
	Resolution	0.1°C; 0.1 °F
	Accuracy	±0.4°C; ±0.8°F
Additional Specifications	pH Electrode	HI1230B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662 stainless steel temperature probe with 1 m (3.3') cable (included)
	Slope / Offset Calibration	from 80 to 108% / ±1 pH
	Input Impedance	10^{12} Ohm
	Battery Type / Life	1.5V (3) AAA / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	after 20 minutes of non-use (can be disabled)
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions / Weight	185 x 72 x 36 mm (7.3 x 2.8 x 1.4") / 300 g (10.6 oz.)
Ordering Information	**HI9126** is supplied with HI1230B pH electrode, HI7662 temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer sachet, HI700601 electrode cleaning solution sachet, 100 mL plastic beaker, 1.5V AAA batteries (3), instructions and hard carrying case.	

HI9124 · HI9125

Portable pH/mV Meters

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Waterproof casing
- Battery Error Prevention System (BEPS)
  - Automatically shuts off meter when battery is too low to take accurate readings
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI9124 and HI9125 are portable, waterproof pH meters. The HI9125 can utilize ORP (oxidation reduction potential) electrodes and display results in the mV range.

A large dual-level LCD displays both the pH and temperature along with an operational guide. Graphic symbols are displayed to help the users during the calibration process.

The pH calibration procedure is automatic with five memorized pH buffer values.

These meters utilize the HI1230B double junction pH electrode. The double junction helps to minimize junction contamination for accurate, consistent results.

Specifications		HI9124	HI9125
pH*	Range	-2.00 to 16.00 pH	-2.00 to 16.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01 pH	±0.01 pH
	Calibration	one or two-point with five standard buffer values (pH 4.01, 6.86, 7.01, 9.18, 10.01)	one or two-point with five standard buffer values (pH 4.01, 6.86, 7.01, 9.18, 10.01)
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F) without temperature probe	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F) without temperature probe
mV	Range	–	±699.9 mV; ±1999 mV
	Resolution	–	0.1 mV; 1 mV
	Accuracy	–	±0.2 mV; ±1 mV
Temperature*	Range	-20.0 to 120.0°C (-4.0°F to 248.0°F)	-20.0 to 120.0°C (-4.0°F to 248.0°F)
	Resolution	0.1°C (0.1°F)	0.1°C (0.1°F)
	Accuracy	±0.4°C (±0.8°F)	±0.4°C (±0.8°F)
Additional Specifications Both All Meters	pH Electrode	HI1230B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)	
	Temperature Probe	HI7662 stainless steel temperature probe with 1 m (3.3') cable (included)	
	Slope / Offset Calibration	from 80 to 108% / ±1 pH	
	Input Impedance	10^{12} Ohm	
	Battery Type / Life	1.5V AAA (3) / approximately 200 hours of continuous use.	
	Auto-off	auto-off after 20 minutes of non-use (can be disabled)	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Dimensions / Weight	185 x 72 x 36 mm (7.3 x 2.8 x 1.4") / 300 g (10.6 oz.)	
Ordering Information	**HI9124** and **HI9125** are supplied with HI1230B pH electrode, HI7662 temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, 100 mL plastic beaker, batteries, instructions and hard carrying case.		

HI991001 · HI991002 · HI991003

pH/pH-mV/ORP and Temperature Meters

- Sensor Check™
  - (HI991003) Allows users to check the pH electrode status at any time
- Automatic Temperature Compensation (ATC)
- Two-point calibration
  - Up to two points automatic calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- HELP feature
  - Tutorial messages displayed on LCD

HI991001, HI991002 and HI991003 are ideal for plating baths, wastewater, swimming pool and spa water quality and environmental applications.

HI991003 is a portable pH/pH-mV/ORP and temperature meter with our unique Sensor Check™ feature that allows the user to determine the electrode status at any time. HI991002 measures pH/ORP and temperature while the HI991001 measures pH and temperature.

The HI1296D pH/temperature and HI1297D pH/ORP/temperature probes feature an easy to clean recessed tip that prevents solids in solutions from collecting on the sensor. The titanium body of these probes function as a potential matching pin for increased stability of readings and extended sensor life.

- Pre-amplified pH electrodes
  - The HI1297D pH/ORP electrode and HI1296D pH electrode have an internal temperature sensor and also contain a pre-amplifier to render measurements impervious to noise and electrical interferences.

Specifications		HI991001	HI991002	HI991003
pH*	Range	-2.00 to 16.00 pH	-2.00 to 16.00 pH	-2.00 to 16.00 pH
	Resolution	0.01 pH	0.01 pH	0.01 pH
	Accuracy	±0.02 pH	±0.02 pH	±0.02 pH
	Calibration	automatic one or two-point calibration with two sets of standard buffers available (standard 4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)		
mV	Range	–	±1999 mV	±1999 mV
	Resolution	–	1 mV	1 mV
	Accuracy	–	±2 mV	±2 mV
pH-mV	Range	–	–	±825 mV (pH-mV)
	Resolution	–	–	1 mV
	Accuracy	–	–	±1 mV
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); ±1.0°F (up to 140°F), ±2.0°F (outside)		
Additional Specifications	pH Electrode (HI991003 & HI991002)	HI1297D pre-amplified pH/ORP probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)		
	pH Electrode (HI991001)	HI1296D pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)		
	Temperature Compensation	automatic, -5.0 to 105.0°C (23.0 to 221.0°F)		
	Battery Type / Life	1.5V (3) AAA / approximately 1200 hours of continuous use.		
	Auto-off	auto-off after eight minutes of non-use		
	Environment	0 to 50°C (32 to 122°F); RH max. 100%		
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)		
Ordering Information		**HI991001** is supplied with HI1296D pH/ORP probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700601 electrode cleaning solution sachet (2), batteries, instructions and rugged carrying case. **HI991002** and **HI991003** are supplied with HI1297D pH/ORP probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700601 electrode cleaning solution sachet (2), batteries, instructions and rugged carrying case.		

HI99121

Direct Soil pH Meter

with Measurement Kit

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI99121 is the perfect portable pH meter for soil testing. With the HI99121 and HI1292D direct soil pre-amplified pH and temperature probe, users can test both the pH of soil directly or after preparation of a soil slurry with deionized water.

The HI1292D features a conical, rugged tip that can be directly inserted in moist or soft soil. For harder soils, the kit includes a plastic auger to perforate the ground.

Specifications		HI99121
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI1292D glass body, pre-amplified pH electrode for soil measurement with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99121** is supplied with HI1292D pH electrode, HI721319 soil auger, HI7051M soil preparation solution, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700663 cleaning solution sachet for inorganic soil deposits, HI700664 cleaning solution sachet for organic soil deposits, 100 mL plastic beaker, batteries, instructions and a hard carrying case.	

* Limits will be reduced to actual sensor limits

- Soil preparation solution
  - For higher degrees of accuracy, or for stony ground where the electrode may be damaged, use the included HI7051M soil preparation solution

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

pH solutions begin on page 2.142; electrode cleaning solutions begin on page 2.156

HI99131

Portable pH Meter

for Plating Baths

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Battery life indicator
  - Battery percentage displayed on startup
- HELP feature
  - Tutorial messages displayed on LCD

HI99131 is a waterproof, portable pH and temperature meter supplied with a flat tip probe specifically designed for use in plating baths.

The HI62911D pre-amplified, double junction pH probe features a recessed flat tip that is easy to clean and prevents solids in solutions from collecting on the sensor. The titanium body of the HI 62911D functions as a potential matching pin for increased stability of readings and extended sensor life.

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

Specifications		HI99131
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI62911D titanium body, pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99131** is supplied with HI62911D pH probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachets (2), batteries, instructions and hard carrying case.	

HI99141

Portable pH Meter

for Boiler and Cooling Towers

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

HI99141 is a waterproof, portable pH and temperature meter supplied with a flat tip probe specifically designed for boiler and cooling tower applications.

The HI72911D pre-amplified double junction pH probe features a flat tip sensor that is easy to clean and prevents solids in solutions from collecting on the sensor. The titanium body of the HI72911D functions as a potential matching pin for increased stability of readings and extended sensor life.

Specifications		HI99141
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI72911D titanium body, pre-amplified pH electrode with internal temperature sensor, DIN connector and 1 m (3.3' cable) (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99141** is supplied with HI72911D pH probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachets (2), batteries, instructions and hard carrying case.	

* Limits will be reduced to actual sensor limits

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

HI99171

Portable pH Meter

for Leather and Paper

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI99171 is a portable, waterproof meter designed for use with leather and paper. It provides fast, accurate, direct pH measurements. The LCD features a multi-level display with on-screen tutorial messages for calibration and set-up. HI99171 utilizes a flat tip probe designed to optimize surface contact with the sample.

pH measurement of papers and cartons is important, not only in the production phase, but also in the packaging phase. The food industry, for example, will perform pH compatibility tests between the product and packaging material.

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

Specifications		HI99171
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI1414D glass body, pre-amplified pH electrode with flat tip, internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information		**HI99171** is supplied with HI1414D flat tipped pH and temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700680 electrode cleaning solution for cellulose deposits sachets (2), HI70960 conductive electrolyte solution for pH measurement (30 mL), batteries, instructions and hard carrying case.

* Limits will be reduced to actual sensor limits

pH solutions begin on page 2.142; electrode cleaning solutions begin on page 2.156

HI99181

Portable pH Meter

for Skin

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI99181 is a pH meter specifically designed for the analysis of skin. Essential for labs researching the biological compatibility of cosmetics and pharmaceuticals, the HI99181 provides quick and simple measurements without compromising precision.

The pre-amplified HI1414D/50 probe has been specially designed with a flat tip for accurate skin pH measurement with maximum surface contact. It is easy to clean and maintain.

Specifications		HI99181
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI1414D/50 glass body, pre-amplified pH electrode with flat tip, internal temperature sensor, DIN connector and 1 m (3.3') cable
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99181** is supplied with HI1414D/50 flat tipped pH/temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700620 electrode cleaning and disinfection solution for skin residuals sachets (2), HI700621 electrode cleaning solution for skin grease and sebum sachets (2), batteries, instructions and hard carrying case.	

* Limits will be reduced to actual sensor limits

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

pH solutions begin on page 2.142; electrode cleaning solutions begin on page 2.156

HI99162

pH / Temperature Meter for Milk

with Application Specific Probe

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

The Hanna Instruments HI99162 is a durable, waterproof, and portable pH and temperature meter designed specifically for milk analysis. Automatic calibration is done at one or two points with two sets of buffers. All calibration and measurement readings are automatically compensated for temperature variations. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration instructions.

Calibrate and measure samples right in the case

Our custom carrying case features a beaker holder for calibration on the farm or production floor.

On-screen Features

- Temperature
  - °C and °F measurement modes

- Buffer sets
  - Calibrate to standard (pH 4.01, pH 7.01, pH 10.01) or NIST (pH 4.01, pH 6.86, pH 9.18) buffers

- Calibration prompts
  - On-screen prompts during the calibration process

- Stability indicator
  - "Not Stable" tag disappears when the reading is stable for accurate data recording

- Freeze readings
  - Press the SET/HOLD button to hold readings on the display

- Battery percentage
  - Battery percentage is displayed at startup

- On-screen guides
  - On-screen quick guides for entering calibration and set up

Specifications		HI99162
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±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 Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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)
Additional Specifications	Probe (included)	FC101D pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type/Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	auto-off after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz)
Ordering Information	**HI99162** is supplied with FC101D pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700640 electrode cleaning solution sachets (2), batteries, instruction manual, and rugged carrying case.	

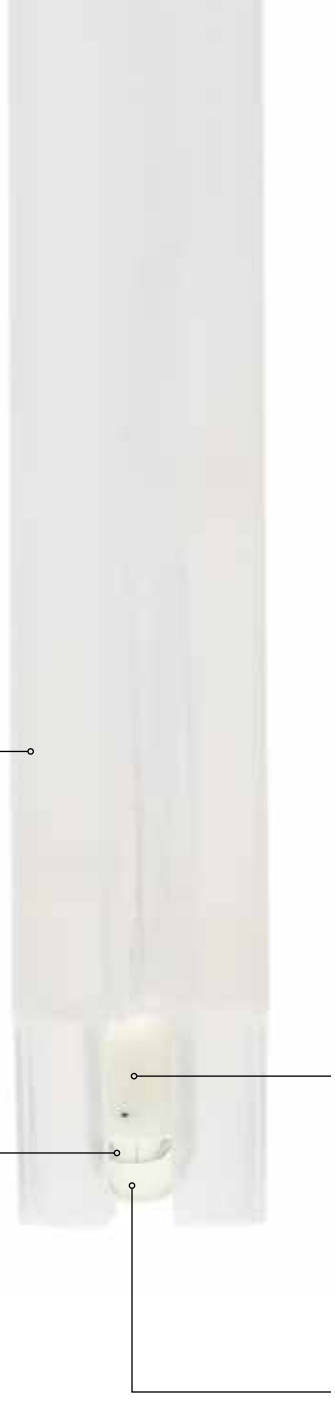
Rugged custom carrying case

The HI99162 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

FC101D

pH / Temperature Probe for Milk

- PVDF body
- Spheric glass tip
- Single ceramic junction
- Double junction
- Built-in temperature sensor



- PVDF body
  - The FC101D is composed of food grade PVDF plastic. This material is highly durable and chemically resistant.

- General purpose glass
  - The FC101D uses general purpose (GP) glass. The formulation allows for fast response over a wide range of temperatures. The FC101D is suitable to use with samples that measure from 0 to 80°C.

- Refillable electrolyte
  - The silver-free electrolyte ensures no precipitate can clog the junction. An easy to use fill cap allows for quick refilling of electrolyte solution to maintain adequate head pressure.

- Single ceramic junction
  - A porous ceramic frit allows the silver-free electrolyte to flow slowly into solution, providing accurate readings for aqueous samples.

- Built-in temperature sensor
  - A thermistor temperature sensor is in the tip of the indicating pH bulb. A temperature sensor should be as close as possible to the indicating pH electrode in order to compensate for variations in temperature.

- Spheric tip shape
  - The shape of the sensing membrane provides a large surface area for contact with milk samples. The highly durable construction provides accurate measurements on the dairy farm as well as the production facility.

Specifications	FC101D
Description	pre-amplified pH/temperature probe
Reference	double, Ag/AgCl
Junction	ceramic, single
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temperature	0 to 80°C (32 to 176°F) - GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	PVDF
Cable	coaxial; 1 m (3.3')
Connection	DIN

HI99164

pH / Temperature Meter for Yogurt

with Application Specific Probe

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

The Hanna Instruments HI99164 is a durable, waterproof, and portable pH and temperature meter designed specifically for yogurt analysis. Automatic calibration is done at one or two points with two sets of buffers. All calibration and measurement readings are automatically compensated for temperature measurements. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration instructions.

Calibrate and measure samples right in the case

Our custom carrying case features a beaker holder for calibration on the production floor.

On-screen Features

- Temperature
  - °C and °F measurement modes

- Buffer sets
  - Calibrate to standard (pH 4.01, pH 7.01, pH 10.01) or NIST (pH 4.01, pH 6.86, pH 9.18) buffers

- Calibration prompts
  - On-screen prompts during the calibration process

- Stability indicator
  - "Not Stable" tag disappears when the reading is stable for accurate data recording

- Freeze readings
  - Press the SET/HOLD button to hold readings on the display

- Battery percentage
  - Battery percentage is displayed at startup

- On-screen guides
  - On-screen quick guides for entering calibration and set up

Specifications		HI99164
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±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 Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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)
Additional Specifications	Probe (included)	FC213D pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type/Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	auto-off after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz)
Ordering Information	**HI99164** is supplied with FC213D pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700643 electrode cleaning solution sachets (2), batteries, instruction manual, and rugged carrying case.	

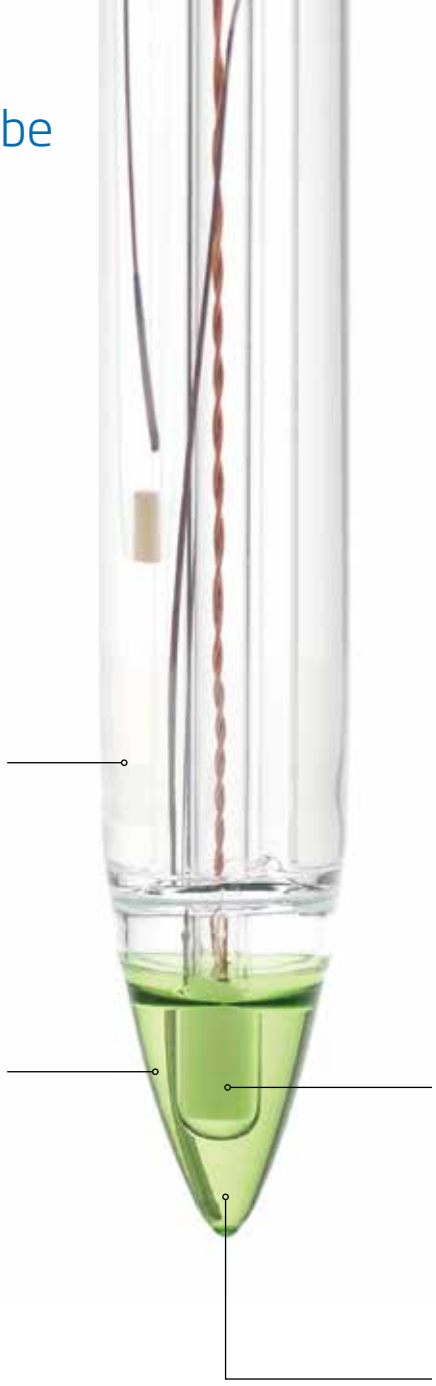
Rugged custom carrying case

The HI99164 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

FC213D

pH / Temperature Probe for Yogurt

- Glass body
- Conic glass tip
- Low temperature glass
- Open Junction reference
- Built-in temperature sensor



- Glass body
  - The glass body of the FC213D allows standards and samples to more quickly reach thermal equilibrium while also providing chemical resistance.

- Low temperature glass
  - The FC213D 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 FC213D is suitable to use with samples that measure from 0 to 50°C.

- 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 yogurt and is maintenance-free.

- Open junction reference
  - 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 FC213D resists clogging and continues to provide accurate, stable readings.

- Built-in temperature sensor
  - A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

- Conic tip shape
  - This design allows for penetration into semisolids and emulsions for the direct measurement of pH in yogurt products.

Specifications	FC213D
Description	pre-amplified pH / temperature probe
Reference	double
Junction	open
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F)
Tip /Shape	conic
Temperature Sensor	yes
Amplifier	yes
Body Material	glass
Cable	coaxial; 1 m (3.3')
Connection	DIN

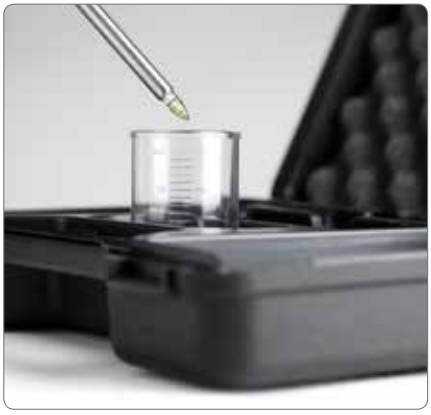
HI99165

pH / Temperature Meter for Cheese

with Application Specific Probe

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

The Hanna Instruments HI99165 is a durable, waterproof, and portable pH and temperature meter designed specifically for cheese analysis. Automatic calibration is done at one or two points with two sets of buffers. All calibration and measurement readings are automatically compensated for temperature measurements. The split-level LCD displays both pH and temperature readings, along with indicators for reading stability, battery percentage, and calibration instructions.



Calibrate samples right in the case

Our custom carrying case features a beaker holder for calibration on the production floor.

On-screen Features

- Temperature
  - °C and °F measurement modes

- Buffer sets
  - Calibrate to standard (pH 4.01, pH 7.01, pH 10.01) or NIST (pH 4.01, pH 6.86, pH 9.18) buffers

- Calibration prompts
  - On-screen prompts during the calibration process

- Stability indicator
  - "Not Stable" tag disappears when the reading is stable for accurate data recording

- Freeze readings
  - Press the SET/HOLD button to hold readings on the display

- Battery percentage
  - Battery percentage is displayed at startup

- On-screen guides
  - On-screen quick guides for entering calibration and set up

Specifications		HI99165
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±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 Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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)
Additional Specifications	Probe (included)	FC242D pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type/Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	auto-off after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz)
Ordering Information	**HI99165** is supplied with FC242D pH probe with internal temperature sensor, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI700642 electrode cleaning solution sachets (2), batteries, instruction manual, and rugged carrying case.	

Rugged custom carrying case

The HI99165 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

FC242D

pH / Temperature Probe for Cheese

- Stainless steel body
- Conic glass tip
- Low temperature glass
- Built-in temperature sensor

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

- Low temperature glass
  - The FC242D 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 FC242D is suitable to use with samples that measure from 0 to 50°C.

- 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 cheese products and is maintenance-free.

- Built-in temperature sensor
  - A thermistor temperature sensor is in the tip of the indicating pH electrode. A temperature sensor should be as close as possible to the indicating pH bulb in order to compensate for variations in temperature.

- Conic tip shape
  - This design allows for penetration into solids, semi solids, and emulsions for the direct measurement of pH in cheese products.

Specifications	FC242D
Description	pre-amplified pH / temperature probe
Reference	single
Junction	ceramic
Electrolyte	viscolene
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temperature	0 to 50°C (32 to 122°F)
Tip /Shape	conic
Temperature Sensor	yes
Amplifier	yes
Body Material	AISI 316 stainless steel
Cable	coaxial; 1 m (3.3')
Connection	DIN

HI99161

Portable pH Meter

for yogurt, cheese, and semi-solids

- For HACCP compliant testing
- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

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

The FC202D pH electrode features a rugged, easy to clean PVDF body with a conical tip making it ideal for measurements in semi-solids such as meats and cheeses. The FC202D uses a free diffusion sleeve type reference junction which helps prevent clogging.

- Specialized electrode
  - The FC202D is the ideal electrode to measure the pH of yogurt, meats, cheeses, fruit, sushi, rice, jams, jellies, dough, ice cream.

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange
HI710024 Blue

Specifications		HI99161
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	FC202D PVDF body, pre-amplified pH electrode with conical tip, internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99161** is supplied with FC202D pH and temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700642 electrode cleaning solution sachets (2), batteries, instructions and hard carrying case.	

* Limits will be reduced to actual sensor limits

pH solutions begin on page 2.142; electrode cleaning solutions begin on page 2.156

HI99163

Portable pH Meter

and Sensor for Meat

- For HACCP compliant testing
- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

HI99163 is a portable pH and temperature meter specially designed for the meat processing industry.

The FC232D pre-amplified pH electrode and removable stainless steel blade enables users to perform non-intrusive measurements of meat products inside and out. The free diffusion junction helps to avoid a clogged reference, where the external body material is non-toxic and food compatible.

- Two blade lengths available
  - Use the optional FC098 (20 mm) or the included FC099 (35 mm) stainless steel penetration blades for meat processing applications

- Optional shockproof rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710023 Orange

Specifications		HI99163
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	FC232D pre-amplified pH probe with internal temperature sensor, DIN connector and 1 m (3.3' cable)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information		**HI99163** is supplied with FC232D pH and temperature probe with FC099 stainless steel blade tip, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700630 electrode acid cleaning solution sachets for meat, grease and fats (2), batteries, instructions and hard carrying case.

HI99192

Portable pH Meter

for Drinking Water

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The Hanna HI99192 is a waterproof portable pH and temperature meter designed specifically for measuring the pH of drinking water.

The HI99192 measures pH from -2.00 to 16.00 pH and temperature from -5.0 to 105.0 °C (23.0 to 221.0 °F). Automatic calibration is performed at one or two points and all readings are automatically compensated. Indicators for stability, battery percentage, and calibration instructions are viewed on the LCD display. The HI99192 uses three 1.5V AAA batteries for an exceptional battery life of 1200 hours of continuous use.

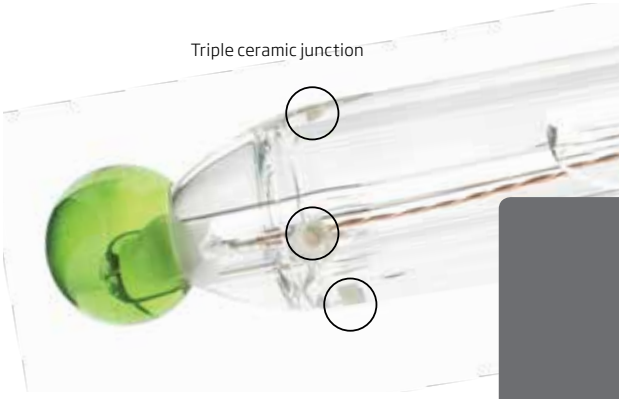
The pH of Drinking Water

The pH of drinking water is a vital measurement. If the pH is too low, or acidic, the water will be corrosive to the distribution system and water pipes in homes. The pH of water also influences other properties including taste, odor, clarity, and efficiency of disinfection efficiency. In the United States, the pH of water is determined by a pH meter according to EPA method 150.1 and Standard Methods 4500-H.

Most drinking water plants use surface water (lakes, rivers, and streams) or groundwater as their point source. Surface water is typically lower in mineral content, which results in lower EC/TDS readings. Groundwater that has percolated through limestone, dolomite or gypsum will have a relatively higher mineral content. Depending on location, there are sources of groundwater that can be very low in mineral content.

Measuring the pH of water that is low in minerals can be difficult. The lower the mineral content the less conductive the water will be. Low conductivity water presents a challenge since the pH meter is an electrochemical system that relies on the solution being measured to be conductive. The HI99192 uses the FC215D amplified pH electrode. The FC215D has three ceramic junctions in the outer reference cell that allows for pH measurement in low conductivity solutions.

Specifications		HI99192
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	FC215D pre-amplified pH electrode with internal temperature sensor, DIN connector, 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99192** is supplied with FC215D pH and temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700661 electrode cleaning solution sachets (2), HI7082 3.5 KCl filling solution, batteries, instructions and hard carrying case.	



FC215D Amplified pH Electrode

- Built-in temperature sensor
  - For automatic compensation of temperature variations
- Refillable pH electrode
- Amplified electrode
  - For fast, stable response that is immuneto electrical noise due to humidity
- Triple ceramic junction design

The HI99192 drinking water pH meter uses the glass body FC215D amplified pH electrode. The amplified electrode provides a fast stable response that is immune to electrical noise due to humidity. The electrode contains an internal temperature probe to allow for automatic compensation for any variances in temperature. The electrolyte solution in the electrode is refillable.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being measured. The ions provide for an electrical connection between the reference electrode and the indicating electrode. A standard pH electrode will use a single ceramic junction that allows for 15 to 20 µL/hour of electrolyte to flow. The FC215D has three ceramic junctions providing for 40 to 50 µL/hour of electrolyte to flow. This increased flow provides a greater continuity between the reference electrode and the indicating electrode, making it suitable for water of low ionic strength. To optimize the flow from the electrode, the refill cap should be unscrewed; this allows for positive head pressure to be created, allowing for the electrolyte to flow more easily into the sample.

HI99151

Portable pH Meter

for Beer Analysis

- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI99151 is a rugged, waterproof, portable pH and temperature meter designed specifically for the brewing industry. The HI99151 uses the FC214D, a titanium bodied, gel filled pH electrode that features high temperature glass and an extendable cloth junction.

The HI99151 measures pH from -2.00 to 16.00 pH and temperature from -5.0 to 105.0 °C (23.0 to 221.0 °F). Automatic calibration is done at one or two points with two sets of buffers and all readings are automatically compensated for temperature variations. Indicators for stability, battery percentage, and calibration instructions are viewed on the primary display. The HI99151 uses three 1.5V AAA batteries for an exceptional battery life of 1200 hours of continuous use.

The Effects of pH in Brewing

In the brewing process, the enzymes required to convert starch into sugar are pH-sensitive, with an optimal pH of 5.2 to 5.6. Different compounds are used to adjust the pH including phosphoric acid, lactic acid and gypsum.

Wort clarity and break formation are also affected by pH. Protein coagulation occurs during wort boiling, where the optimum pH is around pH 4.9, though a common boil pH is pH 5.2. A pH that is too high will not only inhibit coagulation, but also promote browning due to the interaction of amino acids and reducing sugars.

Hop utilization during the wort boil is also affected by pH; as pH increases, the solubility of hop resins increase. A high pH also increases the release of tannins, resulting in a harsher taste, and tends to favor elevated microbial activity.

Specifications		HI99151
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	FC214D pre-amplified pH electrode with internal temperature sensor, DIN connector, 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99151** is supplied with FC214D pH and temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700661 electrode cleaning solution sachets (2), batteries, instructions and hard carrying case.	

* Limits will be reduced to actual sensor limits

FC214D Amplified pH Electrode

- Amplified electrode
  - Provides a fast, stable response that is immune to electrical noise due to static discharge
- Maintenance free gel filled electrode
  - No fill solution required
- Highly durable titanium body
- Extendable cloth junction to prevent clogging
- High temperature glass

The HI99151 beer pH meter uses the titanium bodied FC214D amplified pH electrode with built-in temperature sensor. The amplified electrode provides a fast, stable response that is immune to electrical noise due to static discharge. The body of the electrode is made from titanium, which provides an unbreakable structure that allows the transfer of heat to the internal temperature sensor for rapid temperature compensation.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being measured. It is vital that this flow occurs in order to complete an electrical circuit. Any clogging of the reference junction will prevent the circuit from being completed and will result in readings that are erratic and/or constantly drifting. A typical pH electrode has a junction made of ceramic material. This ceramic material can be easily clogged by samples, such as mash with a high solids content or wort that is viscous. With the cloth junction it is possible to clear the junction by simply extracting 1/8" of the junction from the electrode. This exposes a new portion, resulting in a renewed junction.

HI99111

Portable pH Meter

for Wine Analysis

- Clogging prevention system (CPS™)
- Automatic Temperature Compensation (ATC)
- Two-point calibration
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Battery life indicator
  - Battery percentage displayed on startup
- Help feature
  - Tutorial messages displayed on LCD

The HI99111 is a portable, waterproof pH and temperature meter designed specifically for the wine industry. The HI99111 uses the HI1048D glass bodied pH electrode. Hanna's Clogging Prevention System (CPS™) utilizes the electrodes PE sleeve.

HI99111 measures pH from -2.00 to 16.00 and temperature from -5.0 to 105.0 °C (23.0 to 221.0 °F). Automatic calibration is performed at one or two points with two sets of buffers and all readings are automatically temperature compensated. Indicators for stability, battery percentage, and calibration instructions are viewed on the primary display. The HI99111 uses three 1.5V AAA batteries for an exceptional battery life of 1200 hours of continuous use.

The Importance of pH in Wine Making

The pH of wine is important to determine because it will affect the quality of the final product in terms of taste, color, oxidation, chemical stability and other factors. Generally in winemaking, the higher the pH reading, the lower amount of acidity in the wine. Three important factors in determining the pH of wine include the ratio of malic acid to tartaric acid, the amount of potassium, and the total amount of acid present.

Most wines optimally have a pH between 2.9 and 4.0, with values differing based on the type of wine. Values above pH 4.0 indicate that the wine may spoil quickly and be chemically unstable. Lower pH values allow the wine to stay fresher for a longer period and retain its original color and flavor. High pH wine is more likely to breed bacteria and become unsuitable to drink.

For finished white wines, the ideal pH is between pH 3.00 and pH 3.30, while the final pH for red wine is ideally between pH 3.40 and pH 3.50. The optimal pH before the fermentation process is between pH 2.9 and pH 4.0. The pH of wine therefore not only affects the color of wine, but also the oxidation, yeast fermentation, protein stability, and bacterial growth and fermentation.

Specifications		HI99111
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	one or two-point calibration, two sets of standard buffers available (3.00, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)
	Temperature Compensation	automatic from -5.0 to 105.0°C (23 to 221°F)
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); ±1.0°F (up to 140°F), ±2.0°F (outside)
Additional Specifications	Electrode	HI1048D pH/temperature probe with CPS™ technology, DIN connector, 1 m (3.3') cable (included)
	Battery Type / Life	1.5V AAA (3) / approximately 1200 hours of continuous use
	Auto-off	after 8 minutes of non-use
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz.)
Ordering Information	**HI99111** is supplied with HI1048D pH and temperature probe, pH 3.00 buffer solution sachet, pH 7.01 buffer solution sachet, electrode cleaning solution sachet for wine deposits and electrode cleaning solution sachet for wine stains, batteries, instructions and hard carrying case.	

HI1048D pH electrode

- PE sleeve
- Refillable pH electrode
- Clogging prevention system (CPS™)

The HI99111 portable pH meter for wine uses the glass body HI1048D pH electrode with Hanna's unique Clogging Prevention System (CPS™). This electrode provides a fast stable response and resists clogging. The electrolyte solution in the electrode is refillable.

An integral part of any pH electrode is the reference junction. The reference junction is a part of the electrode that allows for the flow of ions located in the reference cell into the sample being measured. The ions provide for an electrical connection between the reference electrode and the indicating electrode. A standard pH electrode will use a single ceramic junction; however, the CPS™ (Clogging Prevention System) is an innovation in electrode technology. Conventional pH electrodes use ceramic junctions that clog quickly when used in wine. When the junction is clogged, the electrode does not function. CPS™ technology utilizes the porousness of ground glass coupled with a PE sleeve to prevent clogging of the junction. The ground glass allows proper flow of the liquid, while the PE sleeve repels dirt. As a result, pH electrodes with CPS™ stay fresh up to 20 times longer than conventional electrodes.

To optimize the flow from the electrode the refill cap should be unscrewed so that it is open. This allows for positive head pressure to be created allowing for the electrolyte to drain more easily from the reference electrode.

HI8424

General Purpose pH/mV Meter

- Automatic Temperature Compensation (ATC)
- Waterproof
  - Compact, heavy-duty, and waterproof protected casing
- Two-point calibration
  - Automatic one or two-point calibration
- Hold
  - HOLD function
- Battery indicator
  - Low battery indicator

The HI8424 is a highly accurate, portable pH/mV meter. It is one of the most popular pH meters on the market. This instrument is able to perform pH, mV and temperature measurements with a high degree of accuracy and fast response.

Calibration is automatic at one or two points, with three memorized buffer values (pH 4.01, pH 7.01 and pH 10.01). Once the instrument has been calibrated, the buffer values used during calibration are displayed with tags on the LCD. This feature keeps users informed of the current calibration and helps to avoid taking measurements that are out of range.

Users can exchange the pH probe for an ORP probe to obtain ORP readings in the mV range. The HI8424 also offers measurements in °C and °F and has an auto-off feature to preserve battery life.

Specifications		HI8424
pH*	Range	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH
	Calibration	one or two-point , three standard buffers available (4.01, 7.01, 10.01)
	Temperature Compensation	automatic from -20.0 to 120.0°C (-4.0 to 248.0°F) or manual without temperature probe
mV	Range	±699.9 mV; ±1999 mV
	Resolution	0.1 mV; 1 mV
	Accuracy	±0.2 mV; ±1 mV
Temperature*	Range	-20.0 to 120.0°C ; -4.0 to 248.0°F
	Resolution	0.1°C ; 0.1°F
	Accuracy	±0.4°C; ±0.8°F
Additional Specifications	pH Electrode	HI1230B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662 stainless steel temperatures probe with 1 m (3.3') cable (included)
	Slope / Offset Calibration	from 75 to 110% / ±1 pH
	Input Impedance	10^{12} Ohm
	Battery Type / Life	9V / approximately 150 hours of continuous use
	Auto-off	after 20 minutes of non-use (can be disabled)
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions / Weight	164 x 76 x 45 mm (6.5 x 3.0 x 1.8") / 180 g (6.3 oz.)
Ordering Information	**HI8424** is supplied with HI1230B pH electrode, HI7662 temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachets (2), battery, protective case and instructions.	

HI83141 · HI8314

Analog pH/mV Meters

- Automatic Temperature Compensation (ATC)
- Two-point Calibration
- Water-resistant
  - Compact, heavy-duty casing
- Battery indicator
  - Low battery indicator
- Auto shut-off

The HI83141 and HI8314 are portable pH/mV meters designed to be accurate, reliable and easy to use.

The HI8314 uses the HI1217D pre-amplified pH electrode with built-in internal temperature sensor.

The HI83141 uses the HI1230B pH electrode and HI7669AW temperature probe using separate connections.

Manual calibration is performed at one or two points by adjusting the trimmers on the front panel. Capable of measuring pH/mV and temperature, these meters are great for field work, providing one meter for multiple uses.

This instrument is ideal for applications that require a custom calibration point. Manual calibration can be extremely useful in order to achieve better accuracy.

These instruments can also be used for ORP measurements with the optional probes below:

HI83141: **HI3131B**

HI8314: **HI3618D** or **HI4619D**

Specifications

		HI83141	HI8314
pH*	Range	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01 pH	±0.01 pH
	Calibration	manual, two-point, via trimmers	
	Temperature Compensation	automatic, 0 to 70°C (32 to 158 °F)	
mV	Range	±1999 mV	±1999 mV
	Resolution	1 mV	1 mV
	Accuracy	±1 mV	±1 mV
Temperature*	Range	0.0 to 100.0°C; 32.0 to 212.0°F	
	Resolution	0.1°C; 0.1°F	0.1°C; 0.1°F
	Accuracy	±0.4°C; ±0.8F (excluding probe error)	
Additional Specifications	pH Electrode	HI1230B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)	HI1217D PEI body, pre-amplified pH electrode with internal temperature sensor, DIN connector and 1 m cable (included)
	Temperature Probe	HI7669AW stainless steel temperature probe, BNC connector (included)	–
	Slope / Offset Calibration	from 80 to 110% / ±1 pH	
	Battery Type / Life	9V / approximately 450 hours of continuous use	
	Auto Shut-Off	after 8 minutes of non-use	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	
	Weight	230 g (8.1 oz.)	

Ordering Information

HI83141 is supplied with HI1230B pH electrode and HI7669AW temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachets (2), calibration screwdriver, battery, protective case and instructions.

HI8314 is supplied with HI 1217D pH electrode, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachets (2), calibration screwdriver, battery, protective case and instructions.

* Limits will be reduced to actual sensor limits

HI8010 · HI8014

Educational pH Meters

- Automatic Temperature Compensation (ATC)
- Two-point calibration

Hanna Instruments manufactures meters for all levels of use, from education to research grade. HI8010 and HI8014 are rugged, handheld pH meters specifically designed with ease of use in mind. These affordable meters are ideal for education and field applications.

HI8010 and HI8014 perform pH measurements with manual temperature compensation. HI8014 also performs ORP measurements using the mV range and optional ORP electrode (HI3131B).

Two-point calibration can be performed with trimmers on the front panel. Temperature is manually compensated by using the trimmer.

These rugged, manual pH meters are perfect for teaching students the fundamentals of pH measurement.

Specifications		HI8010	HI8014
pH*	Range	0.00 to 14.00 pH	0.00 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01pH	±0.01pH
	Calibration	manual, two point, through trimmers (offset ±1 pH; slope: 85 to 105%)	manual, two point, through trimmers (offset ±1 pH; slope: 85 to 105%)
	Temperature Compensation	manual from 0 to 100°C (32 to 212°F)	manual from 0 to 100°C (32 to 212°F)
mV	Range	–	±1999 mV
	Resolution	–	1 mV
	Accuracy	–	±1 mV
Additional Specifications	pH Electrode	HI1230B PEI body pH electrode with BNC connector and 1 m (3.3') cable (included)	
	Slope/Offset Calibration	from 80 to 105%/±1 pH	
	Input Impedance	10^{12} Ohm	
	Battery Type / Life	9V / approximately 100 hours of continuous use	
	Environment	0 to 50°C (32 to 122°F); RH max 95%	
	Dimensions / Weight	185 x 82 x 53 mm (7.3 x 3.2 x 2.1") / 265 g (9.3 oz.)	
Ordering Information		**HI8010** and **HI8014** are supplied with HI1230B pH electrode, calibration screwdriver, battery and instructions.	

HI8427 · HI931001

pH/mV Precision Simulators

- Simulate pH or ORP sensors to troubleshoot your meter
- Simulate temperature
- Provided with universal BNC connector

HI8427 is designed specifically to simulate pH and ORP electrodes to confirm proper functioning of your meter. Standard pH and mV ranges are selectable with a dial on the front panel and pH can simulate sensor response at temperatures between 0 to 50°C.

Provided with a universal BNC connector, this unit is also a high impedance tester for cable and connector inspection with a leakage sensitivity of 10^9 ohm. This unique tester eliminates the need for very expensive MΩ meters.

Sometimes it is difficult to recognize whether a particular malfunction is due to the meter or the electrode. By simply connecting HI931001 to your meter's input socket and turning the dials, pH readings can be simulated from 0 to 14 pH in 0.01 steps. The output signals all correspond to pH values at 25°C.

For the mV range, HI931001 can simulate output from -1000 to +1000 mV in 1 mV steps.

Specifications		HI931001	HI8427
pH*	Range	0.00 to 14.00 pH	0, 2, 4, 7, 10, 12, 14 pH
	Resolution	0.01 pH	–
	Accuracy	±0.01 pH	±0.1 pH
mV	Range	-1000 to 1000 mV	-1900, -350, 350, 1900 mV
	Resolution	1 mV	–
	Accuracy	±1 mV	±5 mV
Additional Specifications	Impedance Test	–	10^9 Ohm
	Temperature Compensation	all output values are simulated at 25°C	manual from 0 to 50°C (32 to 122°F)
	Battery Type / Life	9V / approximately 500 hours of use	9V / approximately 100 hours of use
	Weight	320 g (11.3 oz.)	255 g (9.0 oz.)
	Environment	0 to 50°C (32 to 122°F); RH max 95%	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	185 x 82 x 53 mm (7.3 x 3.2 x 2.1")	185 x 82 x 53 mm (7.3 x 3.2 x 2.1")
Ordering Information	**HI8427** and **HI931001** are supplied with HI7858/1 BNC/BNC coaxial cable		

* Limits will be reduced to actual sensor limits

pH Electrode Application Guides

Abbreviation Guide

Spheric (S)	Glass (G)
Conic (C)	Plastic (P)
Flat (F)	Metal (M)

Application	Recommended Electrodes	Tip Shape	Body Material	Single Reference	Double Reference	Cloth Junction	Ceramic Junction	Open Junction	Viscolene Electrolyte	Gel Electrolyte	KCl 3.5M Electrolyte	KCl 3.5M + AgCl Electrolyte	Refillable	SMART	Temperature Sensor	Amplifier	Pressure (Bar)	Page
Acids, Strong	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Alkaline, Strong	HI2111B (half-cell) + HI5311	S	G		•		•				•						0.1	2.139, 2.140
Aquariums	HI1332B/P	S	P		•		•				•		•				0.1	2.127
Bases, Strong	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Beer	HI1131B/P/D	S	G		•		•				•		•				0.1	2.123
	HI11310*	S	G		•		•				•		•	•	•	•	0.1	2.129
	HI11311*	S	G		•		•				•		•	•	•	•	0.1	2.129
	FC214D	S	M	•		•				•					•	•	3	2.134
Biotechnology (< 100 µl)	HI1083B/P	S	G	•				•	•								0.1	2.122
Boilers and Cooling Towers	HI72911D	F	M		•		PTFE			Polymer					•	•	3	2.138
Cheese	FC200B/D	C	P	•				•		•							0.1	2.132
	FC242D, FC2423	C	M	•			•		•						•	•	0.1	2.135
	FC240B	C	M	•				•		•							0.1	2.133
	FC202D, FC2023, FC2053	C	P	•				•	•					•	•	•	0.1	2.134
Chemicals	HI1332B/P/D	S	P		•		•				•		•				0.1	2.128
Conductivity, Low	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•	•	0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
Conductivity, High	HI1043B/P	S	G		•		•				•		•				0.1	2.122
Creams	FC210B	C	G		•			•	•								0.1	2.132
	FC220B	S	G	•			•					•	•				0.1	2.133
	FC911B	S	P		•		•				•		•			•	0.1	2.134
Dairy (general use)	HI2031B	C	G	•			•					•	•				0.1	2.125
	FC100B	S	P		•		•				•		•				0.1	2.132
	FC101D, FC1013	S	P		•		•				•		•		•	•	0.1	2.132
Emulsions	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•	•	0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
	HI1612D	C	G	•			•					•	•		•	•	0.1	2.127
	HI1413B	F	G	•				•	•								0.1	2.136
	HI1414D	F	G	•				•	•						•	•	0.1	2.136
Fats and Creams	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•	•	0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
Flasks	HI1331B	S	G	•			•					•	•				0.1	2.124
Fluoride, Samples with	HI1143B	S	G		•		•				•		•				0.1	2.124
Food Industry (General Use)	FC100B	S	P		•		•				•		•				0.1	2.132
	FC911B	S	P		•		•				•		•			•	0.1	2.134

*edge® specific electrode

pH Electrode Application Guides

Abbreviation Guide

Spheric (S)
Conic (C)
Flat (F)

Glass (G)
Plastic (P)

Application	Recommended Electrodes	Tip Shape	Body Material	Single Reference	Double Reference	Cloth Junction	Ceramic Junction	Open Junction	Viscolene Electrolyte	Gel Electrolyte	KCl 3.5M Electrolyte	KCl 3.5M + AgCl Electrolyte	Refillable	SMART	Temperature Sensor	Amplifier	Pressure (Bar)	Page
Food, Semi-solid	FC202D, FC2023, FC2053	C	P		•			•	•					•	•	•	0.1	2.134
	FC200B/D	C	P	•				•		•							0.1	2.132
Fruits	FC200B/D	C	P	•				•		•							0.1	2.132
	FC202D, FC2023, FC2053	C	P	•				•	•						•	•	0.1	2.134
Fruit Juices, Organic	FC220B	S	G	•			•					•	•				0.1	2.133
	FC911B	S	P		•		•				•		•			•	0.1	2.134
Frozen, Semi	FC230B	C	P	•				•	•								0.1	2.133
Ham and Sausages	FC200B/D	C	P	•				•		•							0.1	2.132
	FC202D, FC2023, FC2053	C	P	•				•	•						•	•	0.1	2.134
	FC230B	C	P	•				•	•								0.1	2.133
Humidity, High	FC911B	S	P		•		•				•		•			•	0.1	2.134
Hydrocarbons	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Laboratory (General Use)	HI1131B/P/D	S	G		•		•				•		•				0.1	2.123
	HI1230B/D	S	P		•		•			•							2	2.124
	HI1217D	S	P	•			•			•					•	•	2	2.126
	HI1610D	S	G	•			•					•	•		•	•	0.1	2.127
	HI11310*	S	G		•		•				•		•	•	•	•	0.1	2.129
	HI11311*	S	G		•		•				•		•	•	•	•	0.1	2.129
	HI12300*	S	P		•		•			•				•	•	•	2	2.131
	HI12301*	S	P		•		•			•				•	•	•	2	2.131
Leather	HI1413B	F	G	•				•	•								0.1	2.136
	HI1414D	F	G	•				•	•						•	•	0.1	2.136
Meats	FC230B	C	P	•				•	•								0.1	2.133
	FC400B	C	P		•			•	•								0.1	2.133
	FC232D, FC2323	C	P	•				•	•						•	•	0.1	2.135
	FC202D, FC2023, FC2053	C	P		•			•	•					•	•	•	0.1	2.134
	FC2320*	C	P		•			•	•					•	•	•	0.1	2.130
Milk	FC100B	S	P		•		•				•		•				0.1	2.132
	FC101D, FC1013	S	P		•		•				•		•		•	•	0.1	2.132
	FC260B (half-cell)	S	G															2.139
Monitoring, Continuous	HI1135B	S	G		•		•				•		•				3	2.123
	HI1611D	S	G	•			•			•					•	•	2	2.127
Must in Winemaking	HI1048B/P, HI1048B/50	S	G		•			•			•		•				0.1	2.134
	HI1048D	S	G		•			•			•		•		•	•	0.1	2.134
	HI10480*	S	G		•			•			•		•	•	•	•	0.1	2.130
NMR Tubes	HI1093B	S	G	•				•	•								0.1	2.123
Paints	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Paper	HI1413B	F	G	•				•	•								0.1	2.136
	HI1414D	F	G	•				•	•						•	•	0.1	2.136
Photographic Chemicals	HI1230B/D	S	P		•		•			•								2.124
Plating Baths	HI62911D	F	M		•		PTFE				Polymer				•	•	3	2.138
Quality Control	HI1332B/P/D	S	P		•		•				•		•				0.1	2.127
	FC240B	C	M	•				•		•							0.1	2.133

*edge® specific electrode

pH Electrode Application Guides

Abbreviation Guide

Spheric (S)	Glass (G)
Conic (C)	Plastic (P)
Flat (F)	Metal (M)

Application	Recommended Electrodes	Tip Shape	Body Material	Single Reference	Double Reference	Cloth Junction	Ceramic Junction	Open Junction	Viscolene Electrolyte	Gel Electrolyte	KCl 3.5M Electrolyte	KCl 3.5M + AgCl Electrolyte	Refillable	SMART	Temperature Sensor	Amplifier	Pressure (Bar)	Page
Sauces	FC220B	S	G	•			•					•	•				0.1	2.133
	FC911B	S	P		•		•				•		•				0.1	2.134
Seawater	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Semi-solid Products	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•	•	0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
	HI1612D	C	G	•			•					•	•		•	•	0.1	2.127
	FC200B/D	C	P	•				•	•								0.1	2.132
	HI2031B	C	G	•			•					•	•				0.1	2.125
Skin, Scalp	HI1413B	F	G	•				•	•								0.1	2.136
	HI1414D/50	F	G	•				•	•						•	•	0.1	2.136
Soil, Direct	HI1292D	C	G	•			•					•	•		•	•	0.1	2.136
	HI1294D**	C	G	•			•					•	•		•	•	0.1	2.137
Soil Solution	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•		0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
	HI1230B/D	S	P		•		•			•							2	2.124
	HI1292D	C	G	•			•					•	•		•	•	0.1	2.136
	HI1294D**	C	G	•			•					•	•		•	•	0.1	2.137
Solvents	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
Surface Measurements	HI1413B	F	G	•				•	•								0.1	2.136
	HI1414D	F	G	•				•	•						•	•	0.1	2.136
Swimming Pools	HI1297D	C	M	•		•				•					•	•	3	2.137
Titrations, Non Aqueous	HI1151B	S	G		•		•					•	•				0.1	2.123
Tris Buffer	HI1043B/P	S	G		•		•				•		•				0.1	2.122
	HI10430*	S	G		•		•				•		•	•	•	•	0.1	2.129
	HI1144B/D	S	G	•			•				•		•				0.1	2.125
	HI1343B	S	P	•			•				•		•				0.1	2.125
Vials and Test Tubes	HI1330B/P	S	G	•			•					•	•				0.1	2.125
Wastewater	HI1296D/HI12963	S	M	•		•				•					•	•	3	2.137
	HI1297D	C	M	•		•				•					•	•	3	2.137
Water, High Purity	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•		0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
Water, Municipal	HI1297D	C	M	•		•				•					•	•	3	2.137
Water, Potable	HI1053B/P	C	G		•		•				•		•				0.1	2.122
	HI10530*	C	G		•		•				•		•	•	•		0.1	2.129
	HI10533	C	G		•		•				•		•	•	•	•	0.1	2.122
	FC215D	S	G	•			•					•	•		•	•	0.1	2.137
Water Treatment	HI1297D	C	M	•		•				•					•	•	3	2.137
Yogurt	FC200B/D	C	P	•				•	•								0.1	2.132
	FC210B	C	G		•			•	•								0.1	2.132
	FC213D, FC2133	C	G		•			•	•						•	•	0.1	2.135
	FC202D, FC2023, FC2053	C	P		•			•	•					•	•	•	0.1	2.134
	FC2100*	C	G		•			•	•					•	•	•	0.1	2.130
	FC2020*	C	P		•			•	•					•	•	•	0.1	2.130

*edge® specific electrode; **HI9814 GroLine portable meter specific electrode

Unsure about which electrode to choose? Give your local Hanna office a call for assistance.

ORP Electrode Application Guides

Abbreviation Guide

Platinum (Pt) Glass (G)
Gold (Au) Plastic (P)

Application	Recommended Electrodes	Sensor	Body Material	Single Reference	Double Reference	Cloth Junction	Ceramic Junction	Open Junction	Gel Electrolyte	KCl 3.5M Electrolyte	KCl 3.5M + AgCl Electrolyte	Refillable	SMART	Temperature Sensor	Amplifier	Pressure (Bar)	Page
Laboratory (General Use)	HI3131B/P	Pt	G	•			•				•	•				0.1	2.126
	HI3618D, HI36183	Pt	G	•			•				•	•		•	•	0.1	2.126
	HI36180*	Pt	G		•		•				•	•	•	•	•	0.1	2.131
	HI36200*	Pt	P	•			•		•				•	•	•	2	2.131
Oxidants	HI4430B	Au	P	•			•		•							2	2.128
Ozone	HI4430B	Au	P	•			•		•							2	2.128
Quality Control	HI3230B	Pt	P	•			•		•							2	2.128
Titrations, ORP	HI3131B/P	Pt	G	•			•				•	•				0.1	2.126
Water, Municipal	HI3230B	Pt	P	•			•		•							2	2.128
Must in Winemaking	HI3148B	Pt	G		•			•		•		•				0.1	2.135

*edge® specific electrode

Half-Cell and Reference Electrode Application Guides

Abbreviation Guide

Spheric (S) Glass (G)
Cylindric (C) Plastic (P)
Platinum (Pt)
Gold (Au)

Application	Recommended Electrodes	pH Half Cell	ORP Half Cell	Reference	Tip Shape	Body Material	Single Reference	Double Reference	PE Sleeve Junction	Ceramic Junction	KCl 3.5M Electrolyte	Pressure (Bar)	Page
Laboratory (General Use)	HI2111B	•			S	G							2.139
	HI2112B	•			S	P							2.139
	HI3133B		•		Pt	G							2.139
	HI5412			•		G	•			•	•	0.1	2.140
	HI5311			•		G		•		•	•	0.1	2.140
Milk	FC260B	•			S	G							2.139
Remote Filling	HI5314			•		G		•		•	•	3	2.140
	HI5414			•		G	•			•	•	3	2.140
Strong Alkaline Solutions	HI2111B	•			S	G							2.139
Suspended Solids	HI5413			•		G	•		•		•	0.1	2.141
	HI5312			•		G		•	•		•	0.1	2.141
	HI5313			•		P	•			•		0.1	2.141
Titration, Argentometric	HI5110B		•		C	G							2.139
Titrations, General	HI5412			•		G	•			•	•	0.1	2.140
	HI5311			•		G		•		•	•	0.1	2.140
	HI5312			•		G		•	•		•	0.1	2.141
	HI5313			•		P	•			•		0.1	2.141
Titration, Potentiometric	HI3133B		•		Pt	G							2.139

Combination Electrodes

Code	HI1043[ ]	HI1053[ ]	HI10533	HI1083[ ]
Description	refillable, combination pH electrode w/ double junction	refillable, combination pH electrode w/ conical tip	refillable, combination pH electrode w/ conical tip	combination pH electrode w/micro bulb for small samples
Reference	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl
Junction / Flow Rate	ceramic, double / 30-40 µL/h	ceramic, triple / 40-50 µL/h	ceramic, triple / 40-50 µL/h	open
Electrolyte	KCl 3.5M	KCl 3.5M	KCl 3.5M	viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 14	pH: 0 to 12	pH: 0 to 13	pH: 0 to 13
Recommended Operating Temp.	0 to 100°C (32 to 212°F) - HT	-5 to 70°C (23 to 158°F) - LT	-5 to 100°C (23 to 212°F) - LT	0 to 50°C (32 to 122°F) - GP
Tip /Shape	spheric (dia: 9.5 mm)	conic (12 x 12 mm)	conic (12 x 12 mm)	spheric (dia: 3 mm)
Temperature Sensor	no	no	yes	no
Amplifier	no	no	yes	no
Body Material	glass – HT	glass – LT	glass – LT	glass – GP
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	hydrocarbons, paints, solvents, sea water, strong acids and bases, high conductivity samples, tris buffer	fats and creams, high purity water, soil samples, potable water, semi-solid products, low conductivity solutions, emulsions	fats and creams, high purity water, soil samples, potable water, semi-solid products, low conductivity solutions, emulsions	biotechnology, samples < 100 µL
Connection	**HI1043B** BNC **HI1043P** BNC + pin*	**HI1053B** BNC **HI1053P** BNC + pin*	**HI10533** Quick Connect DIN	**HI1083B** BNC **HI1083P** BNC + pin*
	* For pH meters with CAL Check™ system	* For pH meters with CAL Check system		* For pH meters with CAL Check system

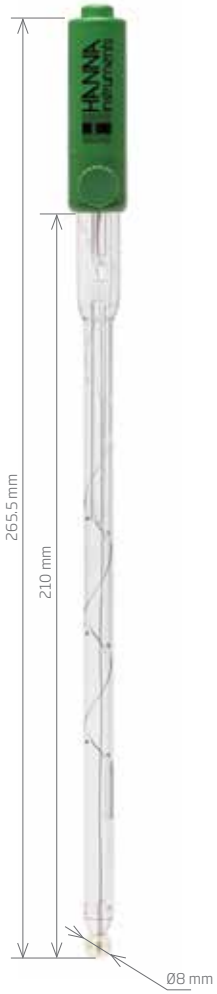
Unsure about which electrode to choose? Give your local Hanna office a call for assistance.

Combination Electrodes

Code	HI1093B	HI1131[ ]	HI1151B	HI1135B
Description	combination pH electrode w/ extended length and micro bulb	refillable, combination pH electrode	refillable, combination pH electrode	refillable, combination pH electrode w/ side arm construction and fast flow rate
Reference	single, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl
Junction / Flow Rate	open	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, double / 30-40 µL/h
Electrolyte	viscolene	KCl 3.5M	–	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	0.1 bar	3 bar with back pressure
Range	pH: 0 to 13	pH: 0 to 13	pH: 0 to 13	pH: 0 to 14
Recommended Operating Temp.	0 to 50°C (32 to 122°F) - GP	0 to 100°C (32 to 212°F) – HT	0 to 100°C (32 to 212°F) – HT	0 to 100°C (32 to 212°F) – HT
Tip /Shape	spheric (dia: 3 mm)	spheric (dia: 9.5 mm)	spheric (dia: 9.5 mm)	spheric (dia: 9.5 mm)
Temperature Sensor	no	no	no	no
Amplifier	no	no	no	no
Body Material	glass – GP	glass	glass	glass
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	NMR tubes	laboratory general purpose, beer	non-aqueous titration	continuous monitoring with remote filling
Connection	**HI1093B** BNC	**HI1131B** BNC **HI1131P** BNC + pin*	**HI1151B** BNC	**HI1135B** BNC

* For pH meters with CAL Check™ system

Combination Electrodes



Code	HI1143B	HI1331B	HI1230[ ]
Description	refillable, combination pH electrode for fluoride applications	combination pH electrode	combination pH electrode
Reference	double, Ag/AgCl	single, Ag/AgCl	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M	KCl 3.5M + AgCl	gel
Max Pressure	0.1 bar	0.1 bar	2 bar
Range	pH: 0 to 10	pH: 0 to 13	pH: 0 to 12
Recommended Operating Temp.	-5 to 60°C (23 to 140°F) – HF	0 to 70°C (32 to 158°F) – GP	-5 to 70°C (23 to 158°F) – LT
Tip /Shape	spheric (dia: 9.5 mm)	spheric (dia: 7.5 mm)	spheric (dia: 7.5 mm)
Temperature Sensor	no	no	no
Amplifier	no	no	no
Body Material	glass	glass	PEI
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	samples with fluoride (max 2 g/L @ pH 2 and temperature < 60°C)	specific for flasks	field applications, soil solution, photographic chemicals, laboratory (general use)
Connection	**HI1143B** BNC	**HI1331B** BNC	**HI1230B** BNC

Combination Electrodes

Code	HI1144B	HI1330[ ]	HI1343B	HI2031B
Description	refillable, combination pH electrode with calomel references	refillable, combination pH electrode	combination pH electrode	refillable, conical tip combination pH electrode
Reference	single, Hg/Hg_2Cl_2	single, Ag/AgCl	single, Hg/Hg_2Cl_2	single, Ag/AgCl
Junction / Flow Rate	ceramic / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M	KCl 3.5M + AgCl	KCl 3.5M	KCl 3.5M + AgCl
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 14	pH: 0 to 12	pH: 0 to 14	pH: 0 to 12
Recommended Operating Temp.	0 to 60°C (32 to 140°F) – HT	-5 to 70°C (23 to 158°F) - LT	0 to 60°C (32 to 140°F) - HT	-5 to 70°C (23 to 158°F) - LT
Tip /Shape	spheric (dia: 9.5 mm)	spheric (dia: 5 mm)	spheric (dia: 7.5 mm)	conic (6 x 10 mm)
Temperature Sensor	no	no	no	no
Amplifier	no	no	no	no
Body Material	glass	glass	PEI	glass
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	tris buffer	specific for vials and test tubes	specific for Tris buffer	dairy and semi-solid products
Connection	**HI1144B** BNC	**HI1330B** BNC **HI1330P** BNC + pin*	**HI1343B** BNC	**HI2031B** BNC

* For pH meters with CAL Check™ system

Special pH and ORP Electrodes

Code	HI3131B	HI3618D/HI36183	HI1217D
Description	refillable combination ORP electrode	ORP combination electrode	pH electrode
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single
Electrolyte	KCl 3.5M + AgCl	KCl 3.5M + AgCl	gel
Max Pressure	0.1 bar	0.1 bar	2 bar
Range	ORP: ±2000 mV	ORP: ±2000 mV	pH: 0 to 13
Recommended Operating Temp.	-5 to 70°C (23 to 158°F)	-5 to 70°C (23 to 158°F)	0 to 70°C (32 to 158°F) - GP
Tip /Shape	platinum pin	platinum pin	spheric (dia: 5.0 mm)
Temperature Sensor	no	yes	yes
Amplifier	no	yes	yes
Body Material	glass	glass	PEI
Cable	coaxial; 1 m (3.3')	5-pole; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	laboratory general use, ORP titrations	laboratory	general purpose
Connection	**HI3131B** BNC	**HI36183** Quick Connect DIN **HI3618D** DIN**	**HI1217D** DIN**

** Recommended for use with HI8314 pH meter

** Recommended for use with HI8314 pH meter

Tips for the Most Accurate Measurements

Keep Electrode Hydrated

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

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

Clean Electrodes Before Use

Clean the junction of your electrodes once a day or at least once a week to prevent junction clogging and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15 to 20 minutes. Hanna offers a wide range of cleaning solutions for general purpose and specific applications.

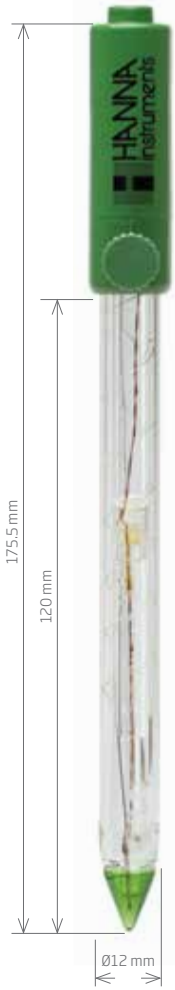
Replace Electrodes Once a Year

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

Additional Tips

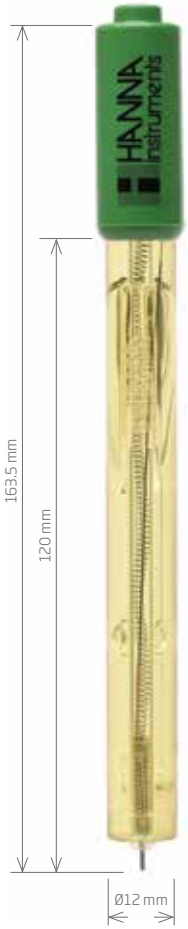
- Calibration and storage solutions should be changed regularly (i.e. monthly).
- Calibrate the meter often if a high degree of accuracy is required.
- Remember that the calibration is as only as good the buffer being used (i.e. old or contaminated buffer may not have the same value on the label).
- Single-use calibration sachets, as opposed to bottles, ensure that your buffer solution is always fresh.
- If the meter takes an unusually long time to get a stable reading, the junction may be clogged.
- Rinse the probe with purified water after each use.

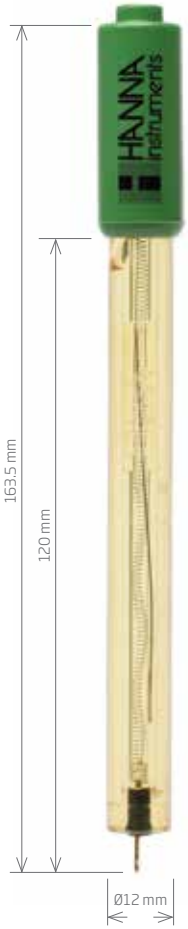
pH Electrodes with Temperature Sensor



Code	HI1610D	HI1611D	HI1612D
Description	pH electrode	pH electrode	pH electrode
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single	ceramic, triple / 40-50 µL/h
Electrolyte	KCl 3.5M + AgCl	gel	KCl 3.5M + AgCl
Max Pressure	0.1 bar	2 bar	0.1 bar
Range	pH: 0 to 13	pH: 0 to 14	pH: 0 to 12
Recommended Operating Temp.	0 to 70°C (32 to 158°F) - GP	0 to 80°C (32 to 176°F) - HT	-5 to 70°C (23 to 158°F) - LT
Tip /Shape	spheric (dia: 9.5 mm)	spheric (dia: 9.5 mm)	conic (12 x 12 mm)
Temperature Sensor	yes	yes	yes
Amplifier	yes	yes	yes
Body Material	glass	glass	glass
Cable	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')
Recommended Use	laboratory general use	continuous monitoring	emulsions, semi-solid samples
Connection	**HI1610D** DIN*	**HI1611D** DIN*	**HI1612D** DIN*
	* Recommended for use with HI8314 pH meter	* Recommended for use with HI8314 pH meter	* Recommended for use with HI8314 pH meter

Rugged pH and ORP Electrodes

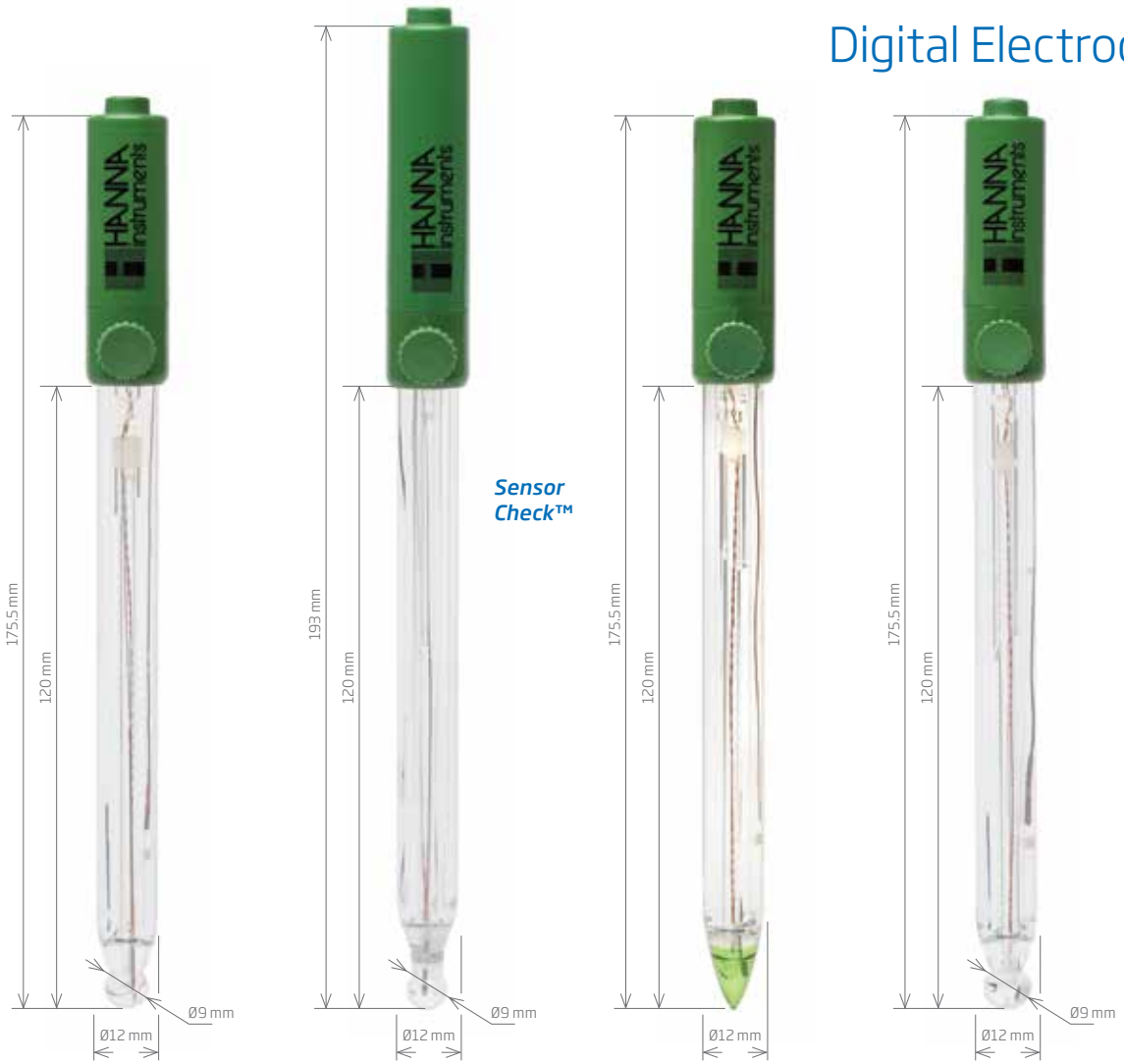




Code	HI1332[ ]	HI3230B	HI4430B
Description	pH electrode	gel-filled, combination ORP electrode w/ platinum contact	gel-filled, combination ORP electrode w/ gold contact
Reference	double, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single	ceramic, single
Electrolyte	KCl 3.5M	gel	gel
Max Pressure	0.1 bar	2 bar	2 bar
Range	pH: 0 to 13	ORP: ±2000 mV	ORP: ±2000 mV
Recommended Operating Temp.	0 to 70°C (32 to 158°F) - GP	-5 to 70°C (23 to 158°F)	-5 to 70°C (23 to 158°F)
Tip /Shape	spheric (dia: 7.5 mm)	platinum pin	gold pin
Temperature Sensor	no	no	no
Amplifier	no	no	no
Body Material	PEI	PEI	PEI
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	chemicals, field applications, quality control, aquariums	municipal water, quality control	oxidants, ozone
Connection	**HI1332B** BNC **HI1332P** BNC + pin* **HI1332D** DIN	**HI3230B** BNC	**HI4430B** BNC

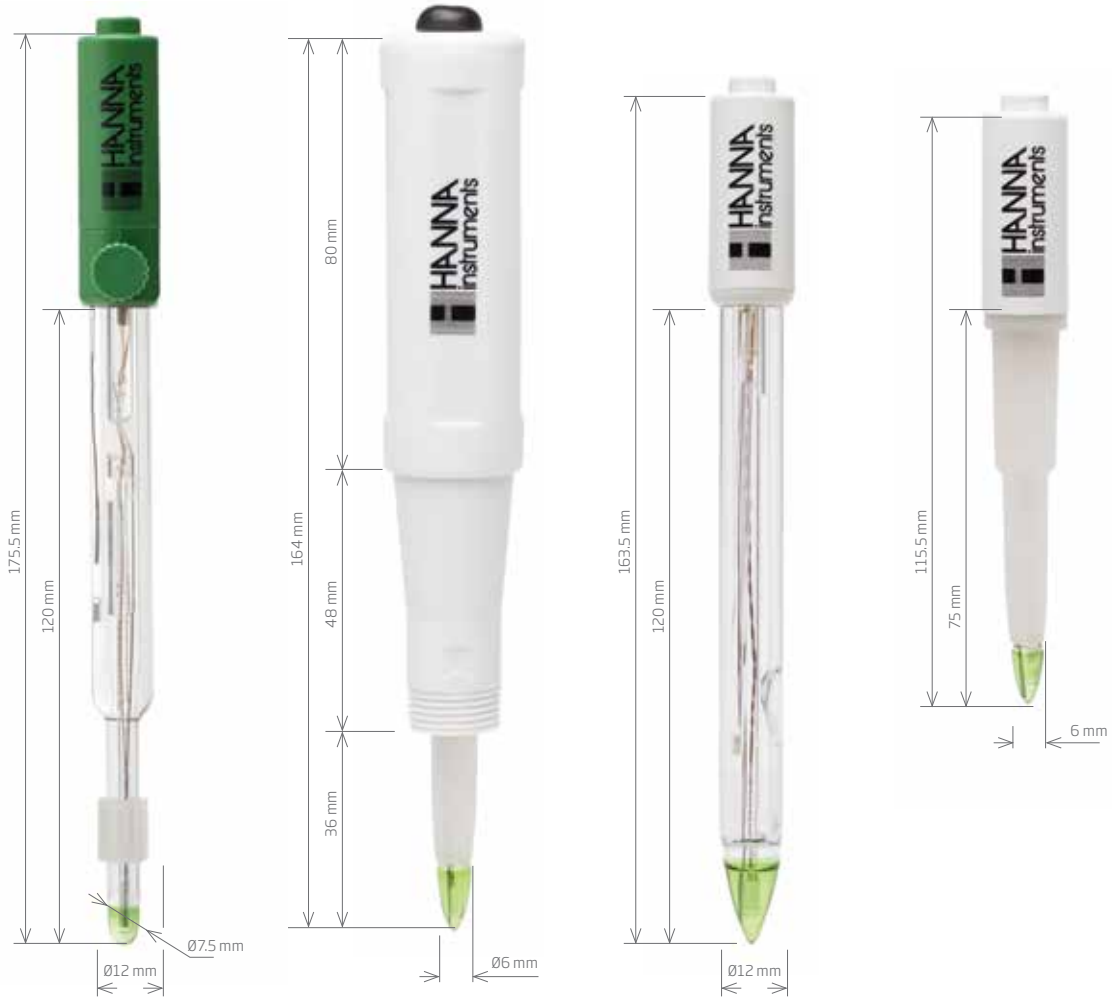
* For pH meters with CAL Check™ system

Digital Electrodes



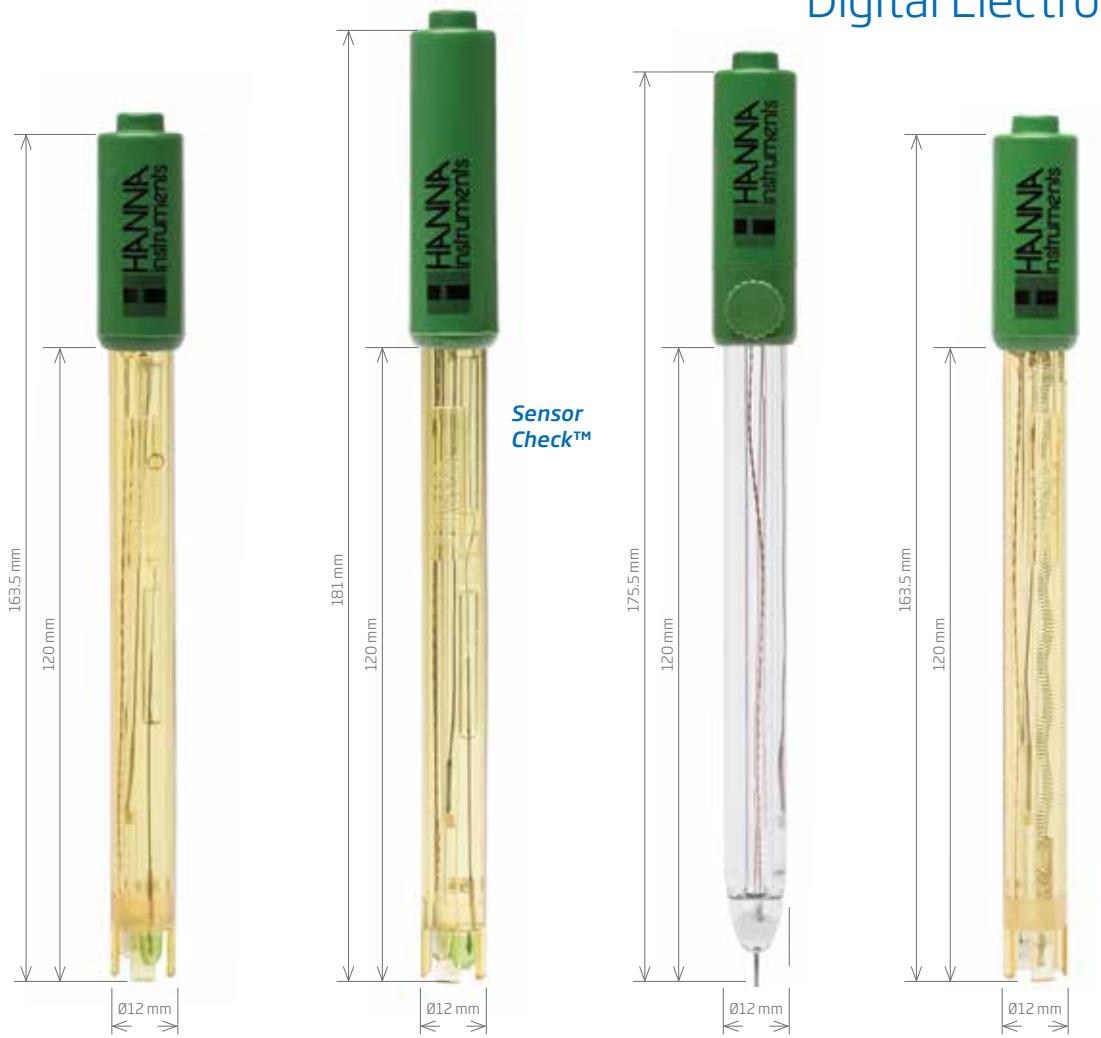
Code	HI11310	HI11311	HI10530	HI10430
Description	refillable, combination, digital pH electrode	refillable, combination, digital pH electrode w/ Sensor Check™	refillable, combination, digital pH electrode with conical tip	refillable, combination, digital pH electrode with double junction
Reference	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl
Junction	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, triple / 40-50 µL/h	ceramic, triple / 40-50 µL/h
Electrolyte	KCl 3.5M	KCl 3.5M	KCl 3.5M	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13	pH: 0 to 13	pH: 0 to 13	pH: 0 to 13
Recommended Operating Temp.	-5 to 100°C (23 to 212°F) - HT	-5 to 100°C (23 to 212°F) - HT	-5 to 100°C (23 to 212°F) - LT	-5 to 100°C (23 to 212°F) - HT
Tip /Shape	spheric (dia: 9.5 mm)	spheric (dia: 9.5 mm)	conic (12 x 12 mm)	spheric (dia: 9.5 mm)
Temperature Sensor	yes	yes	yes	yes
Matching Pin	no	yes	no	no
Amplifier	yes	yes	yes	yes
Body Material	glass	glass	glass	glass
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	laboratory general purpose, beer	laboratory general purpose, beer	fats and creams, high purity water, soil samples, potable water, semi-solid products, low conductivity solutions, emulsions	hydrocarbons, paints, solvents, sea water, strong acids and bases, high conductivity samples, tris buffer
Connection	**HI11310** 3.5 mm connector	**HI11311** 3.5 mm connector	**HI10530** 3.5 mm connector	**HI10430** 3.5 mm connector

Digital Electrodes



Code	HI10480	FC2320	FC2100	FC2020
Description	refillable, digital pH electrode w/ CPS™ (clogging prevention system)	digital pH electrode	digital pH electrode	digital pH Electrode
Reference	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl
Junction	CPS™	open	open	open
Electrolyte	KCl 3.5M	viscolene	viscolene	viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12	pH: 0 to 12	pH: 0 to 12	pH: 0 to 12
Recommended Operating Temp.	-5 to 60°C (23 to 140°F) - LT	0 to 60°C (32 to 140°F) - LT	0 to 60°C (32 to 140°F) - LT	0 to 60°C (32 to 140°F) - LT
Tip /Shape	dome (dia: 8 mm)	conic (6 x 10 mm)	conic (12 x 12 mm)	conic (6 x 10 mm)
Temperature Sensor	yes	yes	yes	yes
Matching Pin	no	no	no	no
Amplifier	yes	yes	yes	yes
Body Material	glass	PVDF	glass	PVDF
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	application specific purpose, must in winemaking	application specific purpose, meat	application specific purpose, yogurt	application specific purpose, yogurt, cheese
Connection	**HI10480** 3.5 mm connector	**FC2320** 3.5 mm connector	**FC2100** 3.5 mm connector	**FC2020** 3.5 mm connector

Digital Electrodes



Code	HI12300	HI12301	HI36180	HI36200
Description	combination, digital pH electrode	combination, digital pH electrode	refillable, ORP digital probe	ORP digital probe
Reference	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, single
Electrolyte	gel	gel	KCl 3.5M + AgCl	gel
Max Pressure	2 bar	2 bar	0.1 bar	2 bar
Range	pH: 0 to 12	pH: 0 to 12	ORP: ±2000 mV	ORP: ±2000 mV
Recommended Operating Temp.	-5 to 70°C (23 to 158°F) - LT	-5 to 70°C (23 to 158°F) - LT	-5 to 100°C (23 to 212°F)	-5 to 70°C (23 to 158°F)
Tip /Shape	spheric (dia: 7.5 mm)	spheric (dia: 7.5 mm)	platinum pin	platinum pin
Temperature Sensor	yes	yes	yes	yes
Matching Pin	no	yes	no	no
Amplifier	yes	yes	yes	yes
Body Material	PEI	PEI	glass	PEI
Cable**	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	field applications	field applications	laboratory general purpose	field applications
Connection	**HI12300** 3.5 mm connector	**HI12301** 3.5 mm connector	**HI36180** 3.5 mm connector	**HI36200** 3.5 mm connector

Electrodes for the Food Industry

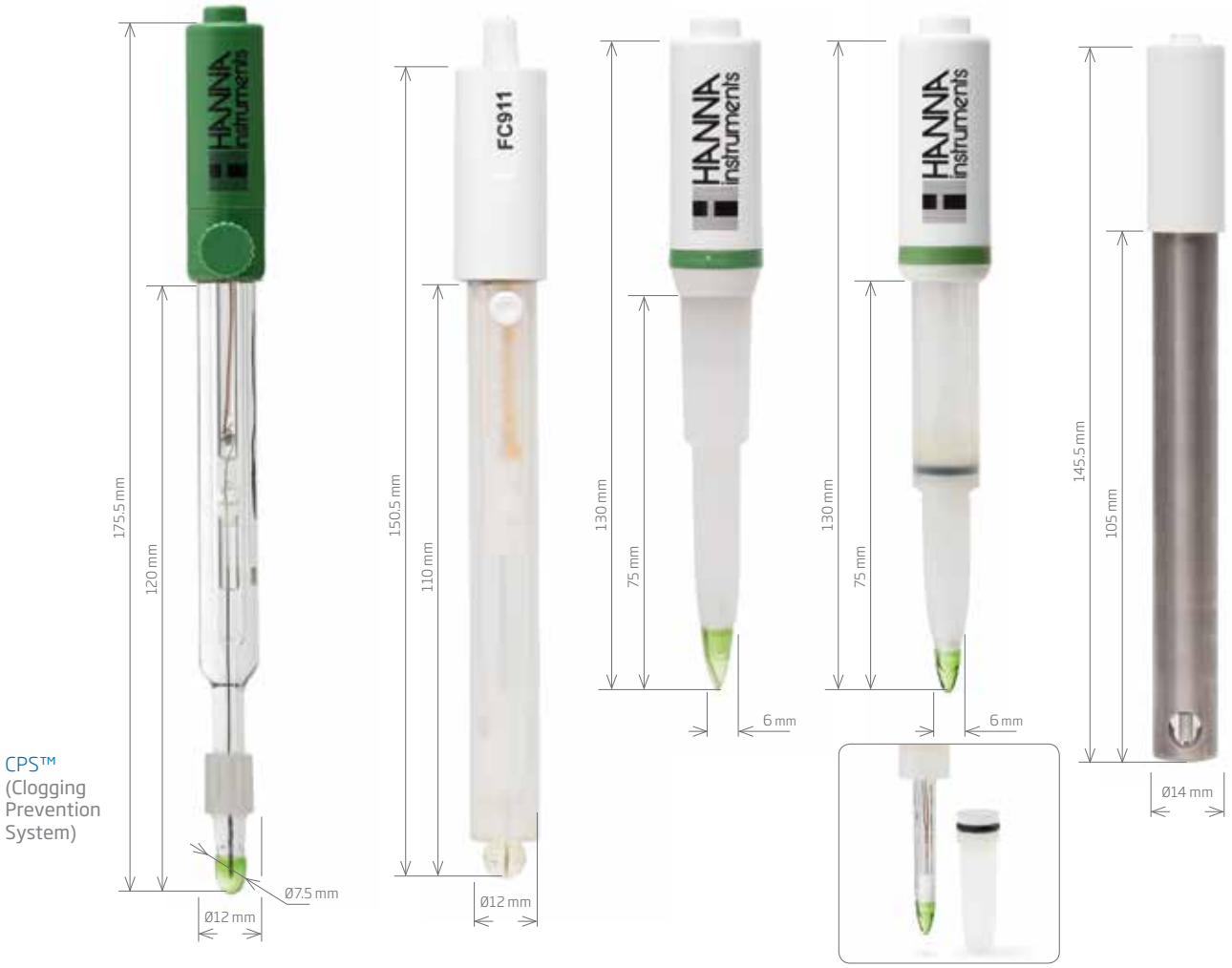
Code	FC100B	FC101D/FC1013	FC200[ ]	FC210B
Description	pH electrode	preamplified pH/ temperature probe	pH electrode	pH electrode
Reference	double, Ag/AgCl	double, Ag/AgCl	single, Ag/AgCl	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	open	open
Electrolyte	KCl 3.5M	KCl 3.5M	viscolene	viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13	pH: 0 to 13	pH: 0 to 12	pH: 0 to 12
Recommended Operating Temp.	0 to 80°C (32 to 176°F) - GP	0 to 80°C (32 to 176°F) - GP	0 to 50°C (32 to 122°F) - LT	0 to 50°C (32 to 122°F) - LT
Tip /Shape	spheric (dia: 7.5 mm)	spheric (dia: 7.5 mm)	conic (6 x 10 mm)	conic (12 x 12 mm)
Temperature Sensor	no	yes	no	no
Amplifier	no	yes	no	no
Body Material	PVDF	PVDF	PVDF	glass
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	food industry (general use), milk	food industry (general use), milk	penetration, yogurt, cheese, semi-solid foods, fruits, ham and sausages	yogurt, creams
Connection	**FC100B** BNC	**FC101D** DIN* **FC1013** Quick Connect DIN**	**FC200B** BNC **FC200D** DIN	**FC210B** BNC

* Recommended for use with HI99162 pH meter
** Recommended for use with HI98162 pH meter

Electrodes for the Food Industry

Code	FC220B	FC230B	FC240B	FC400B
Description	pH electrode	combination pH electrode with PVDF outer body	combination pH electrode with stainless steel sheath	pH electrode
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl	double, Ag/AgCl
Junction / Flow Rate	ceramic, triple / 40-50 µL/h	open	open	open
Electrolyte	KCl 3.5M + AgCl	viscolene	gel	viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12	pH: 0 to 12	pH: 0 to 13	pH: 0 to 12
Recommended Operating Temp.	-5 to 70°C (23 to 158°F) - LT	0 to 50°C (32 to 122°F) - LT	0 to 50°C (32 to 122°F) - GP	0 to 50°C (32 to 122°F) - LT
Tip /Shape	spheric (dia: 9.5 mm)	conic (6 x 10 mm)	conic (3 x 5 mm)	conic (6 x 10 mm)
Temperature Sensor	no	no	no	no
Amplifier	no	no	no	no
Body Material	glass	PVDF	AISI 316	PVDF
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	creams, fruit juices, sauces	meat, semi frozen products	penetration, cheese, quality control	penetration, meat
Connection	**FC220B** BNC	**FC230B** BNC	**FC240B** BNC	**FC400B** BNC

Electrodes for the Food Industry



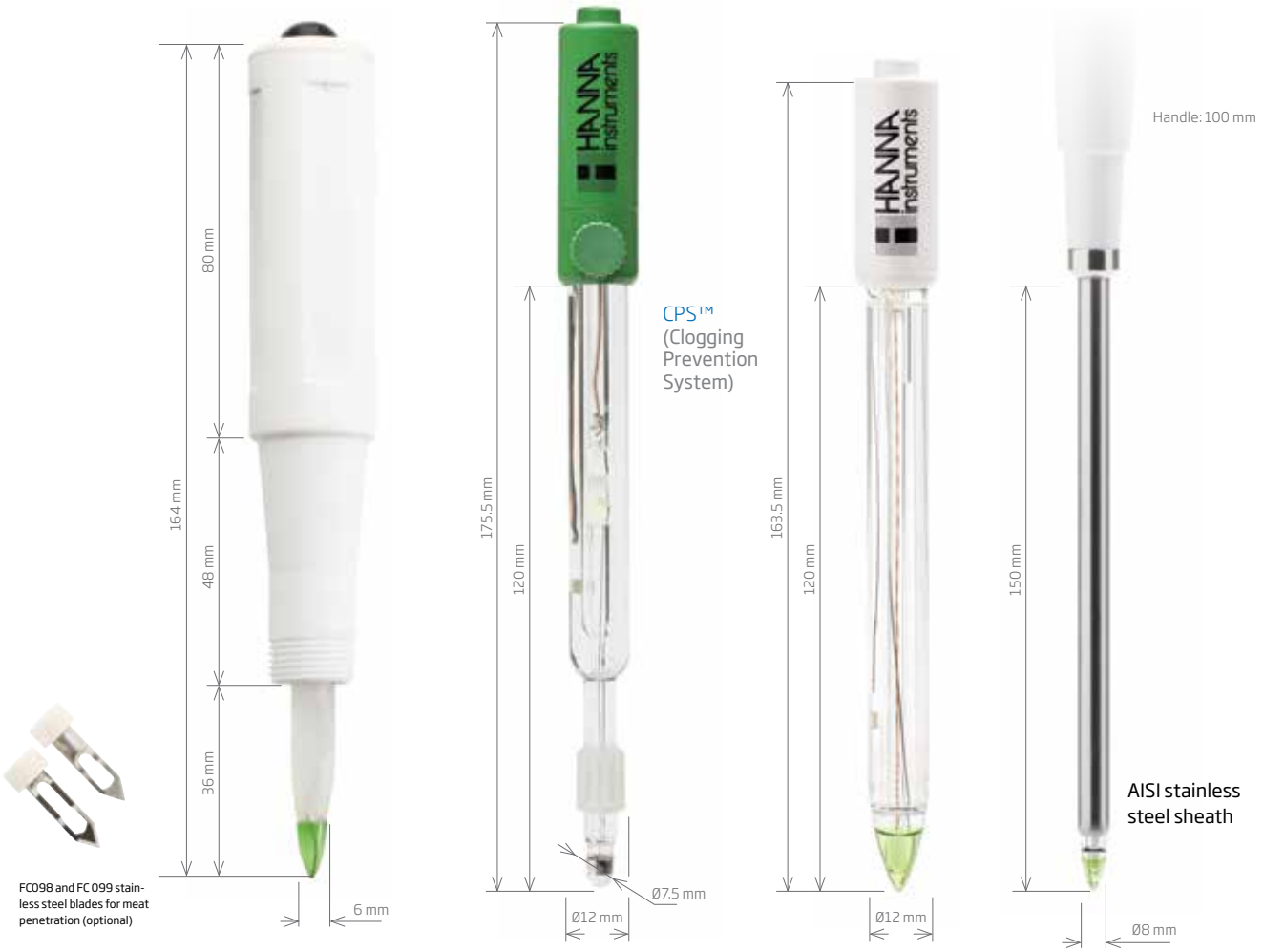
Code	HI1048[ ]	FC911	FC202D/FC2023	FC2053	FC214D
Description	pH electrode with CPS™ (Clogging Prevention System)	pH electrode	pH electrode	pH electrode	pH electrode
Reference	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	double, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	CPS™	ceramic, single / 15-20 µL/H	open	open	cloth
Electrolyte	KCl 3.5M	KCl 3.5M	viscolene	gel	gel
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar	3 bar
Range	pH: 0 to 12	pH: 0 to 13	pH: 0 to 12	pH: 0 to 12	pH: 0 to 13
Recommended Operating Temp.	-5 to 60°C (23 to 140°F) - LT	-5 to 80°C (23 to 176°F) - GP	0 to 50°C (32 to 122°F) - LT	0 to 50°C (32 to 122°F) - LT	0 to 80°C (32 to 176°F) - HT
Tip /Shape	dome (dia: 8 mm)	spheric (dia: 7.5 mm)	conic (6 x 10 mm)	conic (6 x 10 mm)	spheric (dia: 5 mm)
Temperature Sensor	DIN model only	no	yes	yes	yes
Amplifier	DIN model only	yes	yes	yes	yes
Body Material	glass	PVDF	PVDF	PVDF	titanium with HT glass sensor
Cable	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	must in winemaking	creams, fruit juices, sauces, high humidity	yogurt, cheese, meat, semi-solid foods, fruits, ham and sausages	yogurt, cheese, meat, semi-solid foods, fruits, ham and sausages	beer
Connection	**HI1048B** BNC **HI1048B/50** BNC (.4 m (1.3') cable) **HI1048P** BNC + pin* **HI1048D** DIN**	**FC911B** BNC	**FC202D** DIN * **FC2023** Quick Connect DIN **	**FC2053** Quick Connect DIN **	**FC214D** DIN†

* For pH meters with CAL Check™ system
** Recommended for use with HI99111 pH meter

* Recommended for use with HI99161 pH meter
** Recommended for use with HI98161 pH meter

** Recommended for use with HI98161 pH meter

Electrodes for the Food Industry



Code	FC232D/FC2323	HI3148B	FC213D/FC2133	FC242D/FC2423
Description	pH electrode	ORP electrode	pre-amplified pH / temperature probe	pre-amplified pH / temperature probe
Reference	single, Ag/AgCl	double, Ag/AgCl	double	single
Junction	open	CPS™	open	open
Electrolyte	viscolene	KCl 3.5M	viscolene	viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12	ORP: ±2000 mV	pH: 0 to 12	pH: 0 to 12
Recommended Operating Temp.	0 to 50°C (32 to 122°F) - LT	-5 to 80°C (23 to 176°F)	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)
Tip /Shape	conic (6 x 10 mm)	platinum ring	conic	conic (6 x8 mm)
Temperature Sensor	yes	no	yes	yes
Amplifier	yes	no	yes	yes
Body Material	PVDF	glass	glass	AISI 316 stainless steel
Cable	7-pole; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')	coaxial; 1 m (3.3')
Recommended Use	meat	must in winemaking	yogurt	penetration, cheese
Connection	**FC232D** DIN* **FC2323** Quick Connect DIN**	**HI3148B** BNC **HI3148B/50** BNC (.4 m (1.3') cable)	**FC213D** DIN* **FC2133** Quick Connect DIN**	**FC242D** DIN* **FC2423** DIN**

* Recommended for use with HI99163 pH meter
** Recommended for use with HI98163 pH meter

* Recommended for use with HI99164 pH meter
** Recommended for use with HI98164 pH meter

* Recommended for use with HI99165 pH meter
** Recommended for use with HI98165 pH meter

Electrodes for Specific Analysis

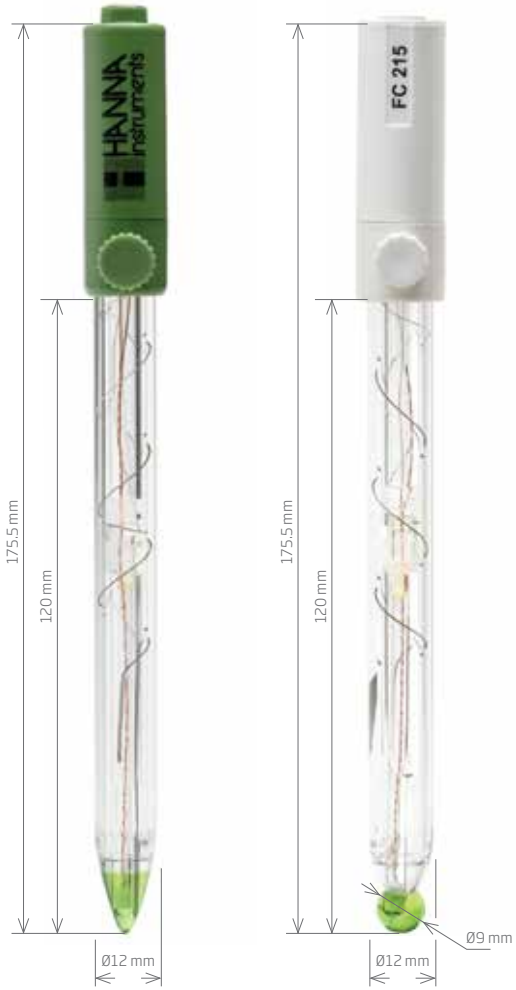
Code	HI1413B	HI1414D	HI1414D/50	HI1292D
Description	pH electrode	pH electrode	pH electrode	pH electrode
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction	open	open	open	ceramic, triple / 40-50 µL/h
Electrolyte	viscolene	viscolene	viscolene	KCl 3.5M + AgCl
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12	pH: 0 to 12	pH: 0 to 12	pH: 0 to 12
Recommended Operating Temp.	0 to 50°C (32 to 122°F) - LT	0 to 50°C (32 to 122°F)	0 to 50°C (32 to 122°F)	-5 to 70°C (23 to 158°F) - LT
Tip /Shape	flat	flat	flat	conic (12 x 12 mm)
Temperature Sensor	no	yes	yes	yes
Amplifier	no	yes	yes	yes
Body Material	glass	glass	glass	glass
Cable	coaxial; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	surface, skin, leather, paper, emulsions	surface, leather, paper, emulsions	skin, scalp	direct soil pH measurement, soil solution
Connection	**HI1413B** BNC	**HI1414D** 7-pin DIN*	**HI1414D/50** DIN†	**HI1292D** 7-pin DIN**

* Recommended for use with HI99171 pH meter

† Recommended for use with HI99181 pH meter

** Recommended for use with HI99121 pH meter

Electrodes for Specific Analysis



Code	HI1294D	FC215D	HI1296[ ]	HI1297D
Description	pH electrode	pH electrode	pH electrode	pH/ORP electrode
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction	ceramic, triple / 40-50 µL/h	ceramic, triple	cloth	cloth
Electrolyte	KCl 3.5M + AgCl	KCl 3.5M + AgCl	gel	gel
Max Pressure	0.1 bar	0.1 bar	3 bar	3 bar
Range	pH: 0 to 12	pH: 0 to 12	pH: 0 to 13	pH: 0 to 13; ORP
Recommended Operating Temp.	-5 to 70°C (23 to 158°F) - LT	0 to 70°C (32 to 158°F) - LT	0 to 80°C (32 to 176°F) - GP	0 to 80°C (32 to 176°F) - GP
Tip /Shape	conic (12 x 12 mm)	spheric (dia: 9.5 mm)	spheric (dia: 5 mm)	pH: conic (3 mm); ORP: platinum sensor
Temperature Sensor	yes	yes	yes	yes
Amplifier	yes	yes	yes	yes
Body Material	glass	glass	titanium	titanium
Cable	7-pole; 1 m (3.3')	coaxial; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	direct soil pH measurement, soil solution	drinking water	wastewater	wastewater, municipal water, water treatment, swimming pools
Connection	**HI1294D** DIN**	**FC215D** DIN*	**HI1296D** DIN** **HI12963** Quick Connect DIN†	**HI1297D** DIN‡

** Recommended for use with HI9814 GroLine multiparameter meter

** Recommended for use with HI991001 pH meter
†Quick connect DIN. For use with HI98190 pH meter only

‡ Recommended for use with HI991002 and HI991003 pH meters

Electrodes for Specific Analysis

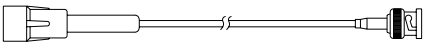
Code	HI62911D	HI72911[ ]
Description	pH electrode	pH electrode
Reference	double, Ag/AgCl	double, Ag/AgCl
Junction	PTFE	PTFE
Electrolyte	polymer	polymer
Max Pressure	3 bar	3 bar
Range	pH: 0 to 13	pH: 0 to 13
Recommended Operating Temp.	0 to 80°C (32 to 176°F) - GP	0 to 80°C (32 to 176°F) - GP
Tip /Shape	flat	flat
Temperature Sensor	yes	yes
Amplifier	yes	yes
Body Material	titanium body working as matching pin	
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	plating baths	cooling towers, boilers
Connection	**HI62911D** DIN*	**HI72911D** DIN** **HI72911B** BNC + phono†

* Recommended for use with HI99131 pH meter

** Recommended for use with HI99141 pH meter
† Recommended for use with HI98191 pH meter

Electrode Extension Cables

Screw Type to BNC Cables / Connectors

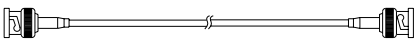


Description

3.0 mm (0.12") cable with screw type and BNC connectors

Part #	Cable Length
HI7855/1	1 m (3.3')
HI7855/3	3 m (9.9')
HI7855/5	5 m (16.5')
HI7855/10	10 m (33')
HI7855/15	15 m (49.5')

BNC to BNC Cables / Connectors



Description

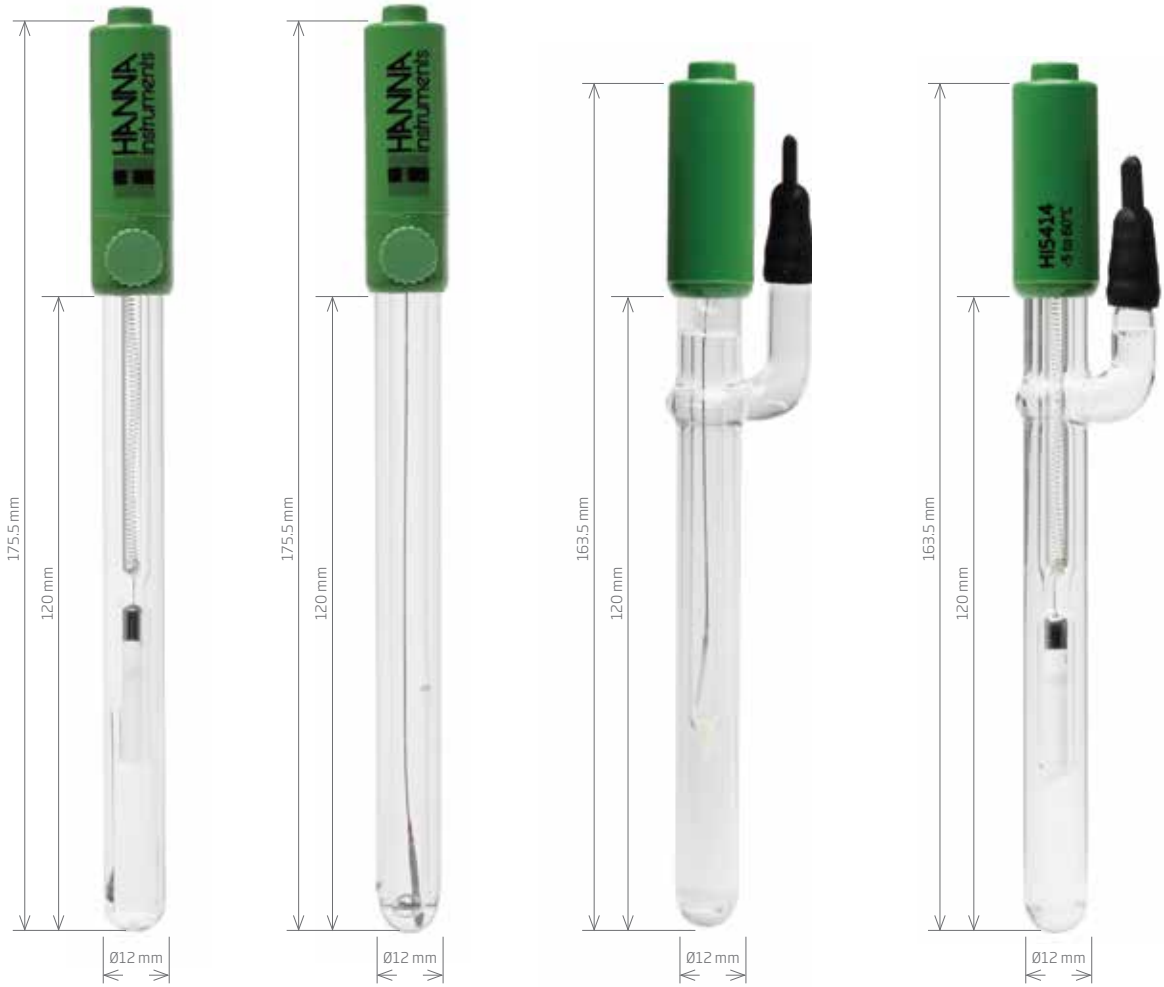
3.0 mm (0.12") cable with BNC connectors

Part #	Cable Length
HI7858/1	1 m (3.3')
HI7858/5	5 m (16.5')
HI7858/10	10 m (33')

Half-Cells

Code	HI2111B	HI2112B	FC260B	HI3133B	HI5110B
Description	pH half-cell	pH half-cell	pH half-cell	ORP half-cell	ORP half-cell
Half Cell	–	–	–	platinum	Ag
Range	pH: 0 to 14	pH: 0 to 13	pH: 0 to 12	mV	mV
Recommended Operating Temp.	0 to 100°C (32 to 212°F)	0 to 70°C (32 to 158°F) - GP	-5 to 100°C (23 to 212°F) - LT	-5 to 100°C (23 to 212°F)	0 to 70°C (32 to 158°F)
Tip /Shape	spheric (dia: 9.5 mm)	spheric (dia: 7.5 mm)	spheric (dia: 9.5 mm)	platinum pin	cylindric (dia: 3 mm)
Body Material	glass	PEI	glass	glass	glass
Cable	coaxial	coaxial	coaxial	coaxial	coaxial
Recommended Use	general purpose, strong alkaline solutions	general purpose	milk	general purpose, potentiometric titration	argentometric titration
Connection	**HI2111B** BNC	**HI2112B** BNC	**FC260B** BNC	**HI3133B** BNC	**HI5110B** BNC

Reference Electrodes

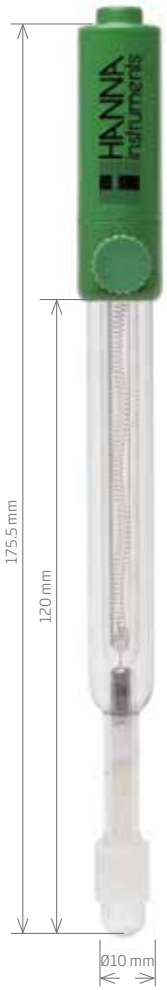


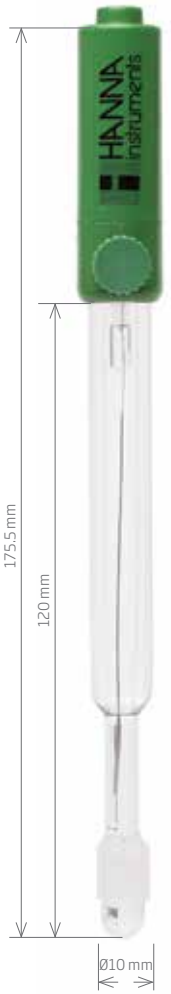
Code	HI5412	HI5311	HI5314	HI5414
Description	reference electrode	reference electrode	reference electrode	reference electrode
Reference	single, Hg/Hg_2Cl_2	double, Ag/AgCl	double, Ag/AgCl	single, Hg/Hg_2Cl_2
Junction / Flow Rate	ceramic, single / 15-20 µL/h	ceramic, single / 15-20 µL/h	ceramic, double	ceramic, double
Electrolyte	KCl 3.5M	KCl 3.5M	KCl 3.5M	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	3 bar with back pressure	3 bar with back pressure
Recommended Operating Temp.	-5 to 60°C (23 to 140°F)	-5 to 100°C (23 to 212°F)	-5 to 100°C (23 to 212°F)	-5 to 60°C (23 to 140°F)
Body Material	glass	glass	glass	glass
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	general purpose, titrations	general purpose, titrations	measurements with remote filling	measurements with remote filling
Connection	**HI5412** 4 mm banana	**HI5311** 4 mm banana	**HI5314** 4 mm banana	**HI5414** 4 mm banana

High pressure or high concentration of contaminants

Because of the special electrode recharge system of the HI5314 and HI5414, it is possible to connect an outside container. This will increase the amount of electrolyte of the reference half cell and thus, the pressure inside the electrode. By so doing, the junction has the ability to work in high pressure environments without the danger of implosion.

Reference Electrodes





Code	HI5413	HI5312	HI5313
Description	reference electrode	reference electrode	reference electrode
Reference	single, Hg/Hg_2Cl_2	double, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	PE sleeve	PE sleeve	ceramic
Electrolyte	KCl 3.5M	KCl 3.5M	gel (KCl 1M + AgCl)
Max Pressure	0.1 bar	0.1 bar	0.1 bar
Recommended Operating Temp.	-5 to 60°C (23 to 140°F)	-5 to 80°C (23 to 176°F)	-5 to 60°C (23 to 140°F)
Body Material	glass	glass	PEI
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	samples with suspended solids	titrations, samples with suspended solids	titrations, samples with suspended solids
Connection	**HI5413** 4 mm banana	**HI5312** 4 mm banana	**HI5313** 4 mm banana

Table of Reference Temperatures

HI5000 calibration solutions are provided with a label presenting a reference table of the relationship between pH or conductivity values and temperature.

Bottles

pH Value @25°C	Code	Package	Certificate of Analysis
1.00	**HI5001**	500 mL	•
1.68	**HI5016**	500 mL	•
2.00	**HI5002**	500 mL	•
2.00	**HI5002-01**	1 L	•
3.00	**HI5003**	500 mL	•
4.01	**HI5004**	500 mL	•
4.01	**HI5004-01**	1 L	•
4.01	**HI5004-R**	500 mL (color coded solution)	•
4.01	**HI5004-R08**	1 G (3.78 L) (2) (color coded solution)	•
5.00	**HI5005**	500 mL	•
5.00	**HI5005-01**	1 L	•
6.00	**HI5006**	500 mL	•
6.86	**HI5068**	500 mL	•
7.01	**HI5007**	500 mL	•
7.01	**HI5007-01**	1 L	•
7.01	**HI5007-G**	500 mL (color coded solution)	•
7.01	**HI5007-G08**	1 G (3.78 L) (2) (color coded solution)	•
7.41	**HI5074**	500 mL	•
8.00	**HI5008**	500 mL	•
8.00	**HI5008-01**	1 L	•
9.00	**HI5009**	500 mL	•
9.18	**HI5091**	500 mL	•
10.01	**HI5010**	500 mL	•
10.01	**HI5010-01**	1 L	•
10.01	**HI5010-V**	500 mL (color coded solution)	•
10.01	**HI5010-V08**	1 G (3.78 L) (2) (color coded solution)	•
11.00	**HI5011**	500 mL	•
12.00	**HI5012**	500 mL	•
12.45	**HI5124**	500 mL	•
13.00	**HI5013**	500 mL	•

Sachets

pH Value @25°C	Code	Package	Certificate of Analysis
1.00	**HI50001-02**	20 mL (25)	•
1.68	**HI50016-01**	20 mL (10)	•
1.68	**HI50016-02**	20 mL (25)	•
2.00	**HI50002-02**	20 mL (25)	•
3.00	**HI50003-02**	20 mL (25)	•
4.01	**HI50004-01**	20 mL (10)	•
4.01	**HI50004-02**	20 mL (25)	•
5.00	**HI50005-02**	20 mL (25)	•
6.86	**HI50068-02**	20 mL (25)	•
7.01	**HI50007-01**	20 mL (10)	•
7.01	**HI50007-02**	20 mL (25)	•
9.00	**HI50009-02**	20 mL (25)	•
9.18	**HI50091-02**	20 mL (25)	•
10.01	**HI50010-01**	20 mL (10)	•
10.01	**HI50010-02**	20 mL (25)	•
11.00	**HI50011-02**	20 mL (25)	•
12.00	**HI50012-01**	20 mL (10)	•
12.00	**HI50012-02**	20 mL (25)	•
12.45	**HI50124-02**	20 mL (25)	•
13.00	**HI50013-02**	20 mL (25)	•

Hanna Combination Kits in Bottles

Use our combination kits for easy ordering and reordering.

Code	Solutions (pH Value @25°C)	Bottle	Certificate of Analysis
HI54710	pH 4.01, pH 7.01, pH 10.01	500 mL (3)	•
HI54710-10	pH 4.01, pH 7.01, pH 10.01, HI70300L	500 mL (4)	•
HI54710-11	pH 4.01, pH 7.01, pH 10.01, HI70300L, HI7061L	500 mL (5)	•

HI6000 Series

±0.002 pH Millesimal Calibration Solutions

- Supplied with Certificate of Analysis
- Accuracy of ±0.002 pH @ 25°C
- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a meter and specially designed multi-reference probe. Reported values are traceable to NIST Standard Reference Materials (SRMs).
- 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.
- Light-tight Bottles
  - Prevents any oxidation from UV light that could alter the buffer value.

Bottles

pH Value @25°C	Code	Package	Certificate of Analysis
1.000	**HI6001**	500 mL	•
1.679	**HI6016**	500 mL	•
2.000	**HI6002**	500 mL	•
3.000	**HI6003**	500 mL	•
4.010	**HI6004**	500 mL	•
4.010	**HI6004-01**	1 L	•
6.000	**HI6006**	500 mL	•
6.862	**HI6068**	500 mL	•
7.010	**HI6007**	500 mL	•
7.010	**HI6007-01**	1 L	•
7.413	**HI6074**	500 mL	•
8.000	**HI6008**	500 mL	•
9.000	**HI6009**	500 mL	•
9.177	**HI6091**	500 mL	•
10.010	**HI6010**	500 mL	•
10.010	**HI6010-01**	1 L	•
12.000	**HI6012**	500 mL	•
12.450	**HI6124**	500 mL	•
13.000	**HI6013**	500 mL	•

Sachets

pH Value @25°C	Code	Package	Certificate of Analysis
1.000	**HI60001-02**	20 mL (25)	•
1.679	**HI60016-02**	20 mL (25)	•
2.000	**HI60002-02**	20 mL (25)	•
4.010	**HI60004-02**	20 mL (25)	•
7.010	**HI60007-02**	20 mL (25)	•
10.010	**HI60010-02**	20 mL (25)	•

Table of Reference Temperatures

H6000 calibration solutions are provided with a label presenting a reference table of the relationship between pH or conductivity values and temperature.

Quick Cal

pH/EC Quick Cal Calibration Solution

Quick Cal is for use with Hanna's GroLine pH and/or EC/TDS meters. Using the Quick Cal function found in compatible meters allows for single-point calibration for pH and/or conductivity sensors.

- Calibration solution for Gro line pH and EC/TDS meters
- pH calibration buffer value of pH 6.86
- EC calibration standard value of 5,000 µS/cm (5.00 mS/cm)
- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials. A conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.

- 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.

Quick Cal pH/EC Bottles

Code	Size	Certificate of Analysis
HI5036-050	500 mL (GroLine)	•
HI5036-023	230 mL (GroLine)	•
HI5036-012	120 mL (GroLine)	•

Quick Cal pH/EC Sachets

Code	Size	Certificate of Analysis
HI50036P	20 mL sachets, 25 pcs. (GroLine)	•

pH Buffer Solutions

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

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

4.01 pH Buffer Solution

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

4.01 pH @ 25°C - Bottles

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

4.01 pH @ 25°C - Sachets

Code	Size	Package	Certificate of Analysis
HI70004C	20 mL	25 pcs.	•
HI70004G	20 mL (GroLIne)	25 pcs.	•
HI70004P	20 mL	25 pcs.	
HI7004P/5	20 mL	500 pcs.	

4.01 and 7.01 pH @ 25°C - Sachets

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

pH Buffer Solutions

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

- 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.

7.01 pH @ 25°C - Bottles

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

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

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

7.01 pH Buffer Solution

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

pH Buffer Solutions

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

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

10.01 pH Buffer Solution

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

10.01 pH @ 25°C - Bottles

Code	Size	FDA Bottle	Certificate of Analysis
HI7010/1G	1 G (3.78 L) (color coded bottle)		on request
HI7010/1L	1 L (color coded bottle)		on request
HI7010L	500 mL		on request
HI7010C	500 mL (color coded solution)		on request
HI7010L/C	500 mL		•
HI7010M	230 mL		on request
HI5100-12	120 mL		on request
HI7010-023	230 mL (GroLine)		•
HI7010-012	120 mL (GroLine)		•
HI8010L	500 mL	•	•
HI8010L/C	500 mL	•	•

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

Code	pH Value	Size	Package	Certificate of Analysis
HI70010C	10.01	20 mL	25 pcs.	•
HI70010P	10.01	20 mL	25 pcs.	
HI70010P/5	10.01	20 mL	500 pcs.	
HI770710C	10.01 & 7.01	20 mL	10 pcs., 5 ea	•
HI770710P	10.01 & 7.01	20 mL	10 pcs., 5 ea	

1.68 pH @ 25°C - Bottles

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

6.86 pH @ 25°C - Bottles

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

6.86 pH @ 25°C - Sachets

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

8.20 pH @ 25°C - Bottle

Code	Size	Package
HI70082M	230 mL	bottle

8.30 pH @ 25°C - Bottle

Code	Size	Package
HI70083M	230 mL	bottle

9.18 pH @ 25°C - Bottles

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

9.18 pH @ 25°C - Sachets

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

pH Buffer Solutions

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

1.68 pH Buffer Solution

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

6.86 pH Buffer Solution

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

8.20 and 8.30 pH Buffer Solution

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

9.18 pH Buffer Solution

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

ORP and Sample Preparation Solutions

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

ORP Test and Pretreatment Solutions

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

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

Use HI7092 for oxidizing or HI7091 for reducing pretreatment.

Soil Sample Preparation Solution

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

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

ORP Test and Pretreatment Solution Bottles

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

Sample Preparation Solution Bottles

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

Electrode Storage Solutions

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

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

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

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

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

Electrode Storage Solutions

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

General Use Electrode Cleaning Solutions - Bottles

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

Specific Electrode Cleaning Solutions - Bottles

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

General Use Electrode Cleaning Solutions - Sachets

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

Specific Electrode Cleaning Solutions - Sachets

Code	Description	Qty/Size
HI700630P	acid cleaning solution for meat grease and fats (food industry)	20 mL (25)
HI700635P	cleaning solution for wine deposits (winemaking)	20 mL (25)
HI700636P	cleaning solution for wine stains (winemaking)	20 mL (25)
HI700640P	cleaning solution for milk deposits (food industry)	20 mL (25)
HI700641P	cleaning and disinfection solution for dairy products (food industry)	20 mL (25)
HI700642P	cleaning solution for cheese deposits (food industry)	20 mL (25)
HI700643P	cleaning and disinfection solution for yogurt products (food industry)	20 mL (25)
HI700661P	general purpose cleaning solution for agriculture	20 mL (25)
HI700663P	cleaning solution for soil deposits (agriculture)	20 mL (25)
HI700664P	cleaning solution for humus deposits (agriculture)	20 mL (25)
HI700670P	cleaning solution for salt deposits (industrial processes)	20 mL (25)

Electrode Fill Solutions

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

- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

The electrolyte level in refillable electrodes should be checked before performing any measurements. If the level is low, refill with the proper electrolyte solution to ensure optimum performance. This simple maintenance helps guarantee adequate head pressure to promote the flow of reference electrolyte into the sample being measured.

Electrode Fill Solutions

Code	Description	Package
HI7071	3.5M KCl with AgCl reference electrolyte	30 mL bottle (4)
HI7071M	3.5M KCl with AgCl reference electrolyte	230 mL bottle
HI7071L	3.5M KCl with AgCl reference electrolyte	500 mL bottle
HI7072	1M potassium nitrate electrode fill solution	30 mL bottle (4)
HI7072L	1M potassium nitrate electrode fill solution	500 mL bottle
HI7075	1M potassium nitrate, 0.7M potassium chloride electrode fill solution	30 mL bottle (4)
HI7076	1M sodium chloride electrode fill solution	30 mL bottle (4)
HI7078	0.5M ammonium sulfate electrode fill solution	30 mL bottle (4)
HI7082	3.5M KCl reference electrolyte for double junction electrodes	30 mL bottle (4)
HI7082M	3.5M KCl reference electrolyte for double junction electrodes	230 mL bottle
HI7082L	3.5M KCl reference electrolyte for double junction electrodes	460 mL bottle
HI8071	3.5M KCl with AgCl reference electrolyte	30 mL FDA bottle (4)
HI8082	3.5M KCl reference electrolyte for double junction	30 mL FDA bottle (4)
HI8093	1M KCl with AgCl reference electrolyte	30 mL FDA bottle (4)