

IP67 | Waterproof



## Food Quality pH Meters

Five models to measure the pH and temperature of food, milk, meat, yogurt and cheese.





# Food Quality pH Meters

## Five models 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 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.

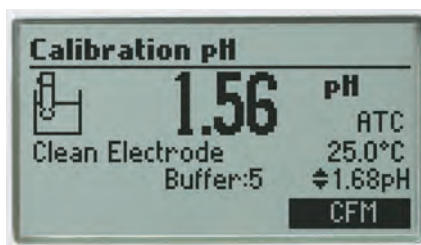


### Quick Connect Probe

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.

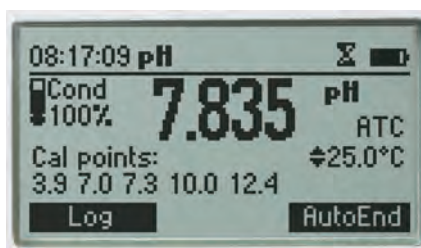


### pH Calibration

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  $\pm 0.002$ .

### 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

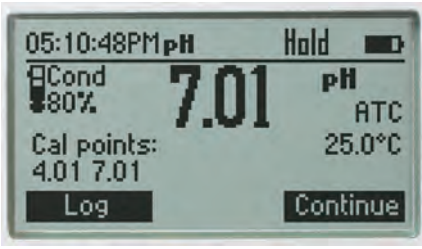
The log-on-demand feature allows users to store up to 200 samples that can be later transferred to a PC with the HI920015 USB cable and HI92000 software.

### 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.

### General Specifications

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	varies by model
	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 <sup>12</sup> 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.)

\* Limits will be reduced to actual probe/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



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.



## Application Importance

One of the most common measurements of food products is pH because of how it effects 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.

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

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





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.



## 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.

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

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



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.



## 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.

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

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



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.



## 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.

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

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



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.



## 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.

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

# Food Quality pH Meters Ordering Information



HI98161 pH Meter for Food includes:



HI98162 pH Meter for Milk includes:



HI98163 pH Meter for Meat includes:



FC2023 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1m (3.3' cable)



HI700641 electrode cleaning solution sachet for dairy deposits (2)



FC1013 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1m (3.3' cable)



HI700640 electrode cleaning solution sachet for milk deposits (2)



FC2323 PVDF body, pH electrode with internal temperature sensor, quick DIN connector and 1m (3.3' cable)



FC099 meat piercing stainless steel blade



HI700630 electrode acid cleaning solution sachet for meat grease and fat deposits (2)



All meters are also supplied with:



rugged carrying case with custom insert

HI98164 pH Meter for Yogurt includes:

HI98165 pH Meter for Cheese includes:



FC2133 glass body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)



HI700643 electrode cleaning and disinfection solution sachet for yogurt products (2)



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)



HI700642 electrode cleaning solution sachet for cheese residues (2)



HI7004M pH 4.01 buffer solution (230 mL)



HI7007M pH 7.01 buffer solution (230 mL)



100 mL plastic beaker (2)



HI92000 PC software



HI920015 micro USB cable



1.5V AA batteries (4)



quality certificate



instruction manual



quick start guide

# Cleaning, Storage and Refilling Solutions

## General and Specific Use Electrode Cleaning Solutions

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

### General Use Electrode Cleaning Solutions

Code	Application	Package
HI70000P	rinsing	20 mL sachet (25)
HI7061L	general purpose	500 mL bottle
HI7073L	proteins	500 mL bottle
HI7074L	inorganic substances	500 mL bottle
HI7077L	oil and fats	500 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	500 mL
HI70631L	alkaline cleaning solution for meat grease and fats	500 mL
HI70632L	cleaning and disinfection solution for blood products	500 mL
HI70640L	cleaning solution for milk deposits	500 mL
HI70641L	cleaning and disinfection solution for dairy products	500 mL
HI70642L	cleaning solution for cheese residues	500 mL
HI70643L	cleaning and disinfection solution for yogurt products	500 mL

### Specific Electrode Cleaning Solutions - Sachets

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

## Electrode Storage Solutions

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI70300 or HI80300 storage solution in the protective cap.



Code	Description	Package
HI70300L	electrode storage solution	500 mL bottle
HI80300L	electrode storage solution	500 mL FDA bottle

## Electrode Fill Solutions

The electrolyte level in refillable electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution to ensure the correct electrode performance. This simple maintenance helps guarantee adequate head pressure to keep the liquid junction flowing.



Code	Description	Package
HI7082L	electrolyte solution, 3.5M KCl	500 mL bottle
HI8082	electrolyte solution, 3.5M KCl	30 mL FDA bottle (4)

# Calibration Solutions

## Technical Calibration Solutions $\pm 0.01$ pH

To obtain precise and valid pH measurements, the pH meter and electrode must be calibrated at a minimum of two different points, close to the value of the sample to be tested. These solutions are dedicated to applications that require extremely accurate pH monitoring, and come with a **certificate of analysis** prepared by comparison against NIST standards.



### Bottles

pH Value @25°C	Code	Package
1.68	<b>HI5016</b>	500 mL
3.00	<b>HI5003</b>	500 mL
4.01	<b>HI5004</b>	500 mL
6.86	<b>HI5068</b>	500 mL
7.01	<b>HI5007</b>	500 mL
9.18	<b>HI5091</b>	500 mL
10.01	<b>HI5010</b>	500 mL
12.45	<b>HI5124</b>	500 mL

### Sachets

pH Value @25°C	Code	Package
1.68	<b>HI50016-02</b>	20 mL (25)
3.00	<b>HI50003-02</b>	20 mL (25)
4.01	<b>HI50004-02</b>	20 mL (25)
6.86	<b>HI50068-02</b>	20 mL (25)
7.01	<b>HI50007-02</b>	20 mL (25)
9.18	<b>HI50091-02</b>	20 mL (25)
10.01	<b>HI50010-02</b>	20 mL (25)
12.45	<b>HI50124-02</b>	20 mL (25)

## Millesimal Calibration Solutions $\pm 0.002$ pH

The millesimal accuracy line of buffers has been prepared to meet the increasing need for assured accuracy in pH measurements. Each bottle in the line is provided with a **certificate of analysis**, prepared by comparison with NIST standards.



### Bottles

pH Value @25°C	Code	Package
1.679	<b>HI6016</b>	500 mL
3.000	<b>HI6003</b>	500 mL
4.010	<b>HI6004</b>	500 mL
6.862	<b>HI6068</b>	500 mL
7.010	<b>HI6007</b>	500 mL
9.177	<b>HI6091</b>	500 mL
10.010	<b>HI6010</b>	500 mL
12.450	<b>HI6124</b>	500 mL

### Sachets

pH Value @25°C	Code	Package
1.679	<b>HI60016-02</b>	20 mL (25)
4.010	<b>HI60004-02</b>	20 mL (25)
7.010	<b>HI60007-02</b>	20 mL (25)
10.010	<b>HI60010-02</b>	20 mL (25)

## Standard Calibration Solutions

Hanna standard pH buffers are carefully prepared and are standardized with high precision meters calibrated with NIST standards.



### Bottles

pH Value @25°C	Code	Package
1.68	<b>HI7001L</b>	500 mL
4.01	<b>HI7004L</b>	500 mL
4.01	<b>HI8004L</b>	500 mL FDA bottle
6.86	<b>HI7006L</b>	500 mL
6.86	<b>HI8006L</b>	500 mL FDA bottle
7.01	<b>HI7007L</b>	500 mL
7.01	<b>HI8007L</b>	500 mL FDA bottle
9.18	<b>HI7009L</b>	500 mL
9.18	<b>HI8009L</b>	500 mL FDA bottle
10.01	<b>HI7010L</b>	500 mL
10.01	<b>HI8010L</b>	500 mL FDA bottle

### Sachets

pH Value @25°C	Code	Package
4.01	<b>HI70004P</b>	20 mL (25)
6.86	<b>HI70006P</b>	20 mL (25)
7.01	<b>HI70007P</b>	20 mL (25)
9.18	<b>HI70009P</b>	20 mL (25)
10.01	<b>HI70010P</b>	20 mL (25)



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