Enhancing Food Quality, Safety & Compliance

With Great Products, Come Great Results.

Test Crucial Parameters for

FOOD & BEVERAGES

POLY SCIENTIFIC

HANNA® instruments

The Importance of pH Measurement in Assuring Product Quality

A functional definition of pH is the measurement of the acidity or alkalinity of a solution commonly measured on a scale of 0 to 14. pH 7 is considered neutral, with lower pH values being acidic and higher values being alkaline or caustic.

Among the reasons for measuring pH in food processing include:

- To produce products with consistent well defined properties
- To efficiently produce products and optimal cost
- To avoid causing health problems to consumers
- To meet regulatory requirements

Exposed Temperature Sensor

Easy Battery Change

pHep pH Tester

HI 98108 (pHep®+)

pH Range: 0.00 to 14.00 pH
Temp. Range: 0.0 to 50.0 °C (32.0 to 122.0 °F)

- Waterproof
- Up to three-point calibration
- Built in temperature sensor for Automatic Temperature Compensated measurements
- Automatic one or two-point calibration
- Stability indicator
- Low battery indicator
- Two-button operation

ORP and pH/ORP Testers

HI 98120

Waterproof ORP & Temperature Meter

ORP Range: ± 1000 mV
Temp. Range: -5.0 to 60.0°C (23.0 to 140.0°F)

HI 98121

Waterproof pH, ORP & Temperature Meter

pH Range: -2.00 to 16.00 pH
ORP Range: ± 1000 mV
Temp. Range: -5.0 to 60.0°C (23.0 to 140.0°F)

- Waterproof
- Automatic one or two-point pH calibration (**HI 98121**)
- Automatic Temperature Compensation (**HI 98121**)
- HOLD feature
- Battery indicator

Pocket Clip

Exposed Temperature Sensor

Protective Cap

Replaceable Electrode Cartridge
pH (**HI 98121**) / ORP (**HI 98120**)

pH and Temperature Testers

HI 98127 (pHep®4)

pH Range: -2.0 to 16.0 pH
Temp. Range: -5.0 to 60.0°C (23.0 to 140.0°F)

HI 98128 (pHep®5)

pH Range: -2.00 to 16.00 pH
Temp. Range: -5.0 to 60.0°C (23.0 to 140.0°F)

Replaceable pH Electrode Cartridge

Exposed Temperature Sensor

Pocket Clip

Protective Cap

- Waterproof
- Automatic Temperature Compensation
- Up to three-point calibration (**HI 98128**)
- Stability indicator
- HOLD button
- BEPS (Battery Error Prevention System)
- Battery % level at startup
- Low Battery Indicator
- Automatic Shut-Off

Multiparameter

HI 98129
Combo pH/EC/TDS/Temperature Tester (Low Range)

pH Range: 0.00 to 14.00 pH
Conductivity Range: 0 to 3999 µS/cm
TDS Range: 0 to 2000 mg/L (ppm)
Temperature Range: 0.0 to 60.0°C (32.0 to 140.0°F)

HI 98130
Combo pH/EC/TDS/Temperature Tester (High Range)

pH Range: 0.00 to 14.00 pH
Conductivity Range: 0.00 to 20.00 mS/cm
TDS Range: 0.00 to 10.00 g/L (ppt)
Temperature Range: 0.0 to 60.0°C (32.0 to 140.0°F)

Replaceable Electrode Cartridge

High Accuracy EC/TDS Graphite Probe

- Waterproof
- Automatic Temperature Compensation
- Stability indicator
- HOLD button
- BEPS (Battery Error Prevention System)
- Battery % level at startup
- Low Battery Indicator
- Auto-off

EC and TDS Testers

HI 98301 (DiST®1)
EC and TDS Range: 0 to 2000 ppm (mg/L)
Temperature Range: 0.0 to 50.0°C (32.0 to 122.0°F)

HI 98302 (DiST®2)
EC and TDS Range: 0.00 to 10.00 ppt (g/L)
Temperature Range: 0.0 to 50.0°C/32.0 to 122.0°F

HI 98303 (DiST®3)
EC and TDS Range: 0 to 2000 µS/cm
Temperature Range: 0.0 to 50.0°C (32.0 to 122.0°F)

HI 98304 (DiST®4)
EC and TDS Range: 0.00 to 20.00 (mS/cm)
Temperature Range: 0.0 to 50.0°C (32.0 to 122.0°F)

Easy-to-Replace Battery

Exposed Temperature Probe

These testers feature an amperometric graphite electrode that provides improved repeatability in measurements, since they do not oxidize.

DiST® non-oxidizing graphite pins are able to provide an optimal surface for accurate, dependable results.

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

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

Water Purity Testers

HI 98308 (PWT)
Pure Water Test
EC Range: 0.0 to 99.9 µS/cm

- Exposed temperature sensor
- Very low range EC 0.0 to 99.9 µS/cm
- Single point manual calibration

HI 98309 (UPW)
Ultra Pure Water
EC Range: 0.000 to 1.999 µS/cm

- Exposed temperature sensor for fast response
- Accurate readings of ultra low range 0.000 to 1.999 µS/cm
- Factory calibrated

EC/TDS and Temperature Testers

HI 98311 (DiST®5)

Low EC Range: 0 to 3999 µS/cm 0.00
Low TDS Range: 0 to 2000 ppm (mg/L)
Temp. Range: 0.0 to 60.0°C (32.0 to 140.0°F)

HI 98312 (DiST®6)

High EC Range: 0.00 to 20.00 mS/cm
High TDS Range: 0.00 to 10.00 ppt (g/L)
Temp. Range: 0.0 to 60.0°C (32.0 to 140.0°F)

- Waterproof and designed to float
- Automatic Temperature Compensation (ATC)
- HOLD button to freeze readings on the display
- Battery Error Prevention System (BEPS)
- Instability & ATC indicators
- Adjustable temperature coefficient factor
- Adjustable TDS conversion factor

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

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

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

Exposed
Temperature Sensor

Replaceable
Graphite Electrode

Pocket
Clip

Digital Thermometer

HI 98501 Checktemp®
with Stainless Steel Penetration Probe

Temp. Range: -50.0 to 150.0°C (-58.0 to 302°F)

- Large display
- User selectable °C or °F
- CAL Check™
- IP65 water resistant protection
- Use as a tool for control in HACCP analysis
- AISI 316 stainless steel penetration probe

CAL Check™

Easy Battery Change
Save Battery Life
with Auto-off Feature

Protective
Probe Sleeve Included

Water Quality in Coffee Brewing

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

Digital Thermometer

HI 98509 Checktemp®1

with Stainless Steel Probe Attached to a 1 m (3.3') Silicone Cable

Temp. Range: -50.0 to 150.0°C (-58.0 to 302°F)

- EN13485 certified
- Battery life up to two years
- HACCP
- Large display
- IP65 water resistant protection
- Silicone probe cable
- AISI 316 stainless steel penetration probe

CAL Check™

Select Between °C or °F Measurement in One Tester

HI 98539 Checktemp®Dip

with Weighted Stainless Steel Probe Attached to a 3 m (9.9') Silicone Cable

Temp. Range: -20.0 to 80.0°C (-4.0 to 176°F)

- Battery life up to two years
- HACCP
- Large display
- IP65 water resistant protection
- Silicone probe cable
- AISI 316 stainless steel weighted probe

Beer pH Tester

HI 981031
with specialized probe

pH Range: 0.00 to 14.00 pH

- Titanium body
- Flat tip pH sensor
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Specialized Flat Tip pH Sensor

Cheese pH Tester

HI 981032
with specialized probe

pH Range: 0.00 to 14.00 pH

The **HI 981032** Foodcaare Cheese pH tester is designed for the measurement of pH during the cheesemaking process.

- pH Electrode with open junction
- Low temperature (LT) glass
- Conical tip
- PVDF body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Conical Tip Electrode

Wine pH Tester

HI 981033
with specialized probe

pH Range: 0.00 to 14.00 pH

- pH electrode with PE movable sleeve junction (CPS Technology)
- Refillable
- Low temperature (LT) glass
- Domed tip
- Glass body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life

Clogging Prevention System
(CPS) Technology

Milk pH Tester

HI 981034
with specialized probe

pH Range: 0.00 to 14.00 pH

The **HI 981034** Foodcare Milk pH tester is designed for the measurement of pH in the milk production process. This meter offers many advanced features including resistance to clogging of the referencejunction, which results in a longer life than standard pH testers.

- pH electrode with open junction
- Low temperature (LT) glass
- Conical tip
- Glass body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Conical Tip Electrode

Sushi pH Tester

HI 981035
with specialized probe

pH Range: 0.00 to 14.00 pH

The **HI 981035** Foodcare Sushi pH tester is designed for the measurement of pH of sushi rice as part of a Hazardous Analysis of Critical Control Points (HACCP) plan.

- Flat tip pH sensor
- pH Electrode with open junction
- Titanium body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Flat Tip Electrode

Meat pH Tester

HI 981036
with specialized probe

pH Range: 0.00 to 14.00 pH

The **HI 981036** Foodcare Meat pH tester is designed for the measurement of pH during the meat processing process.

- pH electrode with replaceable bridge electrolyte
- Low temperature (LT) glass
- Conical tip
- PVDF body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Removable Sleeve
to Extend Probe Life

Bread and Dough pH Tester

HI 981038
with specialized probe

pH Range: 0.00 to 12.00 pH

- pH Electrode with open junction
- Low temperature (LT) glass
- Conical tip
- PVDF body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Conical Tip Electrode

Chocolate pH Tester

HI 981039
with specialized probe

pH Range: 0.00 to 12.00 pH

- pH electrode with replaceable bridge electrolyte
- Low temperature (LT) glass
- Conical tip
- PVDF body
- Large LCD
- Automatic calibration
- Automatic temperature compensation
- Stability indicator
- Automatic shut-off
- Probe diagnostic
- Long battery life
- Economical

Removable Sleeve
to Extend Probe Life

Temperature Dataloggers

HI 144

T-Logger with Locking Wall Cradle

Temp. Range: -30.0 to 70.0 °C (-22.0 to 158.0 °F)

The monitoring of temperature is critical through all stages in food distribution. This includes from the time it is packaged and stored to transportation to the local market or restaurant. For cold food storage it is necessary to ensure that the product is always stored properly to maintain quality and for safety to prevent bacteria growth. The **HI 144-10** will help to be compliant in recording temperatures as part of a HACCP monitoring program.

Using the supplied PC software **HI 144-10** can be programmed to record the temperature in intervals from 1 minute to 24-hours and can store up to 8,000 readings.

The **HI 144-10** is supplied with the **HI 144** T-Logger, USB cradle, wall mount with lock and software. Additional **HI 144** T-loggers can be ordered without the cradle and software. Each T-logger has its own unique serial number.

- Compact waterproof data logger
- Wall mount with lock
- Choice of measurement units °C or °F
- Programmable high and low alarms
- USB docking cradle for programming & transferring of data
- Stores up to 8,000 measurements
- 2-year battery life

Wall Cradle

Waterproof Thermologgers

HI 148-1

T1 internal Temp. Range: -20.0 to 60.0°C (-4.0 to 140.0°F)

HI 148-2

T1 external Temp. Range: -40.0 to 125.0°C (-40.0 to 257.0°F)

HI 148-3

T1 internal Temp. Range: -20.0 to 60.0°C (-4.0 to 140.0°F)
T2 external Temp. Range: -40.0 to 125.0°C (-40.0 to 257.0°F)

HI 148-4

T1 external Temp. Range: -40.0 to 125.0°C (-40.0 to 257.0°F)
T2 external Temp. Range: -40.0 to 125.0°C (-40.0 to 257.0°F)

- IP67 waterproof casing
- USB Type-C connector
- Wall cradle included for versatile installation and easy thermologger removal
- One or two channels, with internal and/or external sensor
- 16,000 samples (for 1-channel models) or 8,000 samples/channels (for 2-channels models)
- Non-volatile storage of logging parameters and data in EEPROM
- Programmable high and low alarms
- BEPS (Battery Error Prevention System)
- Security password and lot serial number
- All **HI 148** thermologgers are factory calibrated
- Storing of temperature at logging interval, or min or max temperature between logging intervals
- Logging delay start from 1 second to 199 hours using the **HI 92148** PC application or the Log start button
- Programmable logging interval from 1 second to 24 hours for 1-channel models, from 2 seconds to 24 hours for 2-channel models

T-Shaped Thermometer

HI 145-00
Celsius Thermometer (125mm)

Temp. Range: -50.0 to 220°C

HI 145-01
Fahrenheit Thermometer (125mm)

Temp. Range: -58.0 to 428.0°F

- Alerts users to calibration status (CAL Check™)
- HOLD button to freeze readings on the display
- HACCP Compliant
- AISI 316 Stainless Steel Probe
- Enhanced Battery Life
- Auto Shut-off after 8 minutes of non-use

Checkfridge™ Remote Sensor Thermometer

HI 147-00
Checkfridge Celsius

Temp. Range: -50.0 to 150.0°C

HI 147-01
Checkfridge Fahrenheit

Temp. Range -58.0 to 302.0°F

Hanna provides users a convenient means to monitor internal temperature conditions of a refrigerator or freezer from the outside. The Hanna **HI 147** Checkfridge is the ideal thermometer for accurate, reliable internal temperature readings.

How do you know when the reading on the thermometer is correct? An ice point or slurry could be made. Even then there could be several degrees difference between the real and theoretical temperatures. With the **HI 147**, there is no need to waste time preparing an ice bath for making these tests; its unique CAL Check feature can simulate it. Conveniently located on the face of the thermometer is a TEST switch. Engage the switch and the **HI 147** performs an internal CAL Check. In only a few seconds, you see the results on the large LCD. Return the switch to the READ position and the **HI 147** returns to its normal measuring status.

- Alerts users to calibration status (CAL Check™)
- Battery Error Prevention System (BEPS)
- With two magnets located on the back of the device
- With food Compatible Cable

- Five-point factory calibration
- Ergonomic shape
- Measures in both °C and °F
- Floating case features IP67 protection
- Large LCD
- Turns on by motion sensor
- Internal calibration verification
- EN 13485 certified models available

Easy to access Battery Compartment

Checktemp®4 Temperature Testers

HI 151

with folding probe and five-point factory calibration

Temp. Range: -50.0 to 300 °C (-58.0 to 572.0 °F)

HI 151 Checktemp 4 is the perfect portable, high-accuracy thermometer for home and professional kitchens. The sharp, stainless steel, fold-out probe is ideal when testing fresh, cooked and semi-frozen food. The sensing tip allows the user to accurate measure the temperature of thin food or the thickest part of the sample. **HI 151** Checktemp 4 measures temperature in both °C and in °F. The thermometer has a waterproof and compact casing and is factory-calibrated. The calibration is verified every time the thermometer is turned ON. The thermometer features a motion sensor which eliminates the need of closing and reopening the probe when the meter goes idle. Six color-coded thermometers are available to meet the food hygiene and Hazard Analysis Critical Control Point (HACCP) regulations.

HI 151
White, for Dairy Products

HI 151-1
Red, for Raw Meat

HI 151-2
Blue, for Raw Fsh

HI 151-3
Yellow, for Cooked Meat

HI 151-4
Green, for Salad and Fruits

HI 151-5
Brown, for Vegetables

Thermistor Thermometers

HI 93501

Temp. Range: -50.0 to 150.0°C (-58.0 to 302.0°F)

- EN 13485 compliant
- FC 762PW thermistor probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- IP65 Waterproof casing
- ±0.1 °C/ ±0.2 °F accuracy
- Accuracy ±0.5°C
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled

Supplied with
FC 762PW
Probe

Interchangeable
with FC 762 Series
Thermistor Probes

Optional
Blue Shockproof
Rubber Boot Offers
Maximum Impact Protection

K-Type Thermocouple Thermometer

HI 935001

Temperature Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- FC 766PW K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casingCAL Check to ensure internal electronics are within acceptable tolerances
- Missing and damaged probe messages
- High accuracy ±0.4°C/±0.7°F

FC 766PW
Penetration Probe

Optional
Blue Shockproof
Rubber Boot Offers
Maximum Impact Protection

Interchangeable
with **FC 766** Series
Thermocouple
Probes

T-Type Thermocouple Thermometer

HI 935004

Temp. Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- EN 13485 compliant
- **FC 767PW** T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled
- IP65 Waterproof casing
- Missing and damaged probe messages
- High accuracy ±0.4°C/±0.7°F

Interchangeable
with **FC 767** Series
Thermocouple
Probes

K-Type Thermocouple Thermometer

HI 935007

with a fixed attached penetration probe

Temp. Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- Fixed K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled
- IP65 Waterproof casing
- Damaged probe messages
- High accuracy ±0.4°C/±0.7°F

T-Type Thermocouple Thermometer

HI 935008

with an attached penetration probe

Temp. Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- EN 13485 compliant
- Fixed T-type thermocouple probe for **HI 935008**
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled
- IP65 Waterproof casing
- Damaged probe messages
- High accuracy ±0.4°C/±0.7°F

Optional Blue Shockproof
Rubber Boot Offers
Maximum Impact Protection

K-Type Thermocouple Thermometer

HI 9350011

with ultra-fast probe

Temperature Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- **FC 766C1** Ultra-Fast K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled
- IP65 Waterproof casing
- High accuracy ±0.4°C/±0.7°F
- Ultra-Fast response penetration probe that reaches 90% of its' final value within 4 seconds

T-Type Thermocouple Thermometer

HI 9350041

with ultra-fast probe

Temperature Range: -50.0 to 199.9°C / 200 to 300°C
(-58.0 to 399.9°F / 400 to 572°F)

- **FC 767C1** Ultra-Fast T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Stability Indicator
- An hourglass indicator is displayed on the LCD until a stable reading is obtained.
- Enable automatic shut off after 8 minutes, 60 minutes, or disabled
- IP65 Waterproof casing
- High accuracy ±0.4°C/±0.7°F
- Ultra-Fast response penetration probe that reaches 90% of its' final value within 4 seconds

Autosampler

HI 922

Automated titration sample handling system designed for use with the HI 932 Automatic Titration System

- Automate up to 18 samples
- 16 or 18 Sample Tray
- Built-in Magnetic Stirrer
- Built-in RFID
- Absolute Encoder
- Barcode Reader
- Optical IR Beaker Detection
- Versatile Electrode Holder
- Electrode Rinse Feature
- Sample Leveling Feature
- Waste Removal Feature
- Control Panel
- Peristaltic and Membrane Pumps
- Status indicator lights

Autosampler
Control Panel

Multipurpose Arm

Chemically
Resistant Pumps

Autosampler
Status Indicator

Automatic Potentiometric Titrator

HI 931

Titration System (pH/mV/ISE)

Electrode Holder

Burrettes and Dosing System

Redesigned and improved

- Compact Design
- Redesigned electrode holder
- Peristaltic Pumps

Titrator capabilities

- Dynamic titrant dosing
- Equivalence endpoint detection
- Signal stability timing
- Multiple equivalence point detection (**HI 932** only)
- Method sequencing (**HI 932** only)
- Multiple titration types
- Direct measurement functionality

Burettes & Dosing System

- Exchangeable burette system
- Multiple burette sizes
- Precision dosing pump
- Automatic reagent addition (**HI 932** only)

Interface & display

- Interactive color display
- Detailed titration graphs

Data

- Data storage
- Flexible GLP management

Connectivity & functionality

- Multifunctional
- Multiple connections (**HI 932** only)

Methods of analysis

- Customizable methods
- Titration method support
- Market specific methods packs
- Adaptable standard methods

Advanced Automatic Potentiometric Titrator

HI 932C1 / HI 932C2

Titration System (pH/mV/ISE)

- **HI 932C1** includes titrator with one analog board
- **HI 932C2** includes titrator with two analog boards
- Compatible with **HI 922** autosampler for analyzing up to 18 samples at a time

Food Analysis Parameter Spotlight

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

Moisture in Food

Moisture content regulates the shelf life of food and is important to measure in both the product and the packaging materials. Regularly monitoring moisture content ensures efficiency and optimum quality in processed foods. Hanna offers Karl Fischer Titrators for moisture determination in foods and beverage products. Hanna offers the **HI 933** Volumetric Karl Fischer Titrator for samples with up to 100% water and the **HI 934** Coulometric Karl Fischer Titrator for samples with water content less than 5%. With an average time per test less than 5 minutes, Karl Fischer Titrators provide a solution for timely quality control testing in house, eliminating the cost and waiting time associated with outside laboratory results. Karl Fischer Titrators are able to quickly, accurately and efficiently determine the moisture content in food products.

Karl Fischer Volumetric Titrator

HI 933

for Moisture Determination
(Analyzes for water content ranging from 100 ppm to 100%)

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

Karl Fischer Coulometric Titrator

HI 934

(Analyzes for water content ranging from 1 ppm to 5%)

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

Acidity in Food and Beverages

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

Mini Titrator and pH Meter

HI 84529

for Measuring Titratable Acidity in Dairy Products

- Piston-driven pump with dynamic dosing
- CAL Check™
- Log-on-demand
- Graphic mode/exportable data
- Automatic stirrer speed control
- GLP features
- Application-specific FC 260B
- **HI 5315** double junction halfcell reference electrode
- Complete with anti-clogging reference electrode
- Pre-standardized titrant and pre-measured reagents
- Help features
- pH/mV meter

Mini Titrator and pH Meter

HI 84532

for Measuring Titratable Acidity in Fruit Juice

The **HI 84532** digital automatic mini titrator and pH meter is designed for measuring the concentration of titratable hydrogen ions contained in fruit juice samples by neutralization with a strong base solution to a fixed pH endpoint as according to the Official Methods of Analysis of AOAC International.

- Piston-driven pump with dynamic dosing
- CAL Check™
- Log-on-demand
- Graphic mode/exportable data
- Automatic stirrer speed control
- Complete with anti-clogging reference electrode
- Pre-standardized titrant and pre-measured reagents
- GLP features
- Easy-to-use interface
- Help features
- pH/mV meter

Research Grade Meter

The **HI 5222** and **HI 5221** are advanced research grade two-channel benchtop meters that are completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. **HI 5222** measures pH/ISE/mV while **HI 5221** measures pH/mV. These meters are rich in features including five-point calibration, selectable resolution, data logging, alarm limits, comprehensive GLP, automatic temperature compensation, and much more. These meters also feature dedicated keys for routine operation and virtual keys for setup options.

HI 5221

pH/ORP & Temperature

pH Range: -2.0 to 20.0 pH;
-2.00 to 20.00 pH;
-2.000 to 20.000 pH

- Capacitive Touch Keypad
- Large Color LCD
- 0.001 pH Resolution
- CAL Check™

HI 5222

pH/ORP/ISE & Temperature

pH Range: -2.0 to 20.0 pH;
-2.00 to 20.00 pH;
-2.000 to 20.000 pH

- Capacitive touch keypad
- Two independent channels
- CAL Check™ Probe Diagnostics

HI 5321

EC/TDS/Resistivity/Salinity and Temperature

EC Range: 0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm;
1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm actual EC*

TDS Range: 0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt;
10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)

Resistivity Range: 1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm;
100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm

Salinity Range: practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt;
percent scale: 0.0 to 400.0%

Temp. Range: ** -20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K

- Capacitive touch keypad
- Autoranging over a wide range from 0.000 µS/cm to 1000.0 mS/cm
- Preprogrammed with USP <645> method

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

Research Grade Meter

HI 5421

Research Grade Bench Meter Dissolved Oxygen & BOD

Dissolved Oxygen Range: 0.00 to 90.00 ppm (mg/L); 0.0 to 600.0 % saturation

Barometric Pressure Range: 450 to 850 mmHg; 600 to 1133 mBar; 60 to 133 KPa; 17 to 33 inHg; 8.7 to 16.4 psi; 0.592 to 1.118 atm

Temperature Range: -20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K

- Capacitive touch keypad
- Built in Barometer for automatic pressure compensation
- BOD, OUR and SOUR methods

HI 5521

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

- Capacitive touch keypad
- Two independent channels
- CAL Check™ Probe Diagnostics

HI 5522

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

- Capacitive touch keypad
- Two independent channels
- ISE choice of concentration units and incremental methods

Specifications	HI 5522 / HI 5521
pH** Range:	-2.000 to 20.000 pH
mV Range:	±2000 mV
ISE Range:	1 x 10-6 to 9.99 x 1010 concentration (**HI 5522** only)
Temp.** Range:	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
EC Range:	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm absolute EC*
TDS Range:	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
Resistivity Range:	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
Salinity Range:	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%

(*) Absolute conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation

(**) Limits will be reduced to actual sensor limits

edge® pH Meters

HI 2002

Dedicated pH/ORP/Temperature Meter

pH* Range: -2.00 to 16.00 pH; -2.000 to 16.000 pH†

- Advanced pH Electrode Diagnostics
- Capacitive Touch
- Large, Easy to Read LCD
- Digital pH Electrodes
- CAL Check
- Sensor Check
- Wall Mount
- Cradle and Electrode Holder
- Two USB Ports
- Data Logging
- Two Operating Modes

(*) Limits will be reduced to actual probe limits
(†) Standard mode only

HI 2020

Multiparameter pH Meter

pH* Range: -2.00 to 16.00 pH; -2.000 to 16.000 pH†

- Digital pH Electrodes
- Sensor Check
- 3.5 mm Probe Input
- Wall Mount
- Cradle and Electrode Holder
- Two USB Ports
- Data Logging
- Two Operating Modes

(*) Limits will be reduced to actual sensor limits
(†) Standard mode only

Portable Field Unit

Wall-mount Cradle

Electrode Holder with Built-in Cradle

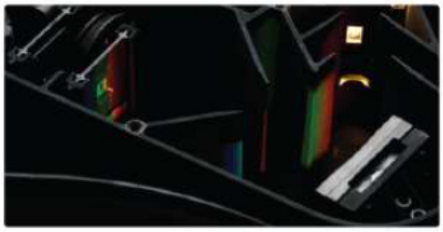
Iris Visible Spectrophotometer

HI 801

- Advanced Split Beam Optical System
- Rechargeable Li-ion Battery
- User Customizable Methods
- Universal Cuvette Holder & Auto Recognition

iris portable spectrophotometer is unlike any of the products we have created in the past. It is different from our photometers as it allows for measurement in the spectrum of all wavelengths of visible light and not just pre–specified wavelengths.

Spectrophotometers work by isolating light at specific wavelengths from white light. This compact meter incorporates a number of features that facilitate both fantastic performance and exceptional usability.



Optical System

Concave Grating

Cuvette Adapters

Replaceable Tungsten-Halogen Lamp

Data Logging and Transfer

Multiparameter Photometer

HI 83300

with Digital pH/Temperature Electrode Input

- Advanced optical system
- Absorbance mode
- Up to 73 different programmed methods measuring 40 key water and wastewater quality parameters
- High performance pH meter that uses advanced digital pH/temperature electrodes

Multiparameter Photometer (COD for Water & Wastewater)

Application Designed Photometers

HI 83399

with Digital pH Electrode Input

- Water and Wastewater Treatment Digestion Parameters
- Advanced optical system
- Backlit 128 x 64 Pixel Graphic LCD Display
- Built-in Reaction Timer for Photometric Measurements
- Absorbance mode
- Units of Measure
- Cuvette Cover
- Data Logging
- Connectivity
- Rechargeable Battery & Battery Status Indicator
- Error Messages

Oil Peroxides Content

<10 meq O_2/kg	Excellent conservation
10-15 meq O_2/kg	Good conservation
<10 meqO_2/kg	Refined oil
>20 meqO_2/kg	Rancid oil

Portable Photometer

HI 83730

for the Determination of Peroxide Value in Olive Oils

Range: 0.0 to 25.0 meq O2/kg

- Built-in timer
- Automatic Shut Off
- Ready-made Reagents
- Battery status indicator
- Error messages
- Units of measure

Peroxide Value

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

COD Test Tube Heater

HI 839800

COD Reactor with 25 Vial Capacity

A COD reactor is used to heat the digestion vials. The digestion vials must be heated to a specific temperature for a period time making the **HI 839800** an important accessory required to have a complete wastewater treatment monitoring system.

- Low and high temperature alerts
- Built-in countdown timer
- Status indicator lights
- Predefined Temperature Settings
- Temperature Alerts
- Overheating Prevention
- Reference Temperature Well
- Two Operating Modes
- Continuous LCD Display
- Error Messages

COD Certified Standards & Reagents

HI 93754A-25 (0 to 150 mg/L)
COD Low Range Reagent Vials, EPA Method (25 tests)

HI 93754B-25 (0 to 1500 mg/L)
COD Medium Range Reagent Vials, EPA Method (25 tests)

HI 93754C-25 (0 to 15000 mg/L)
COD High Range Reagent Vials, Dichromate Method (25 tests)

- Pre-dosed reagents for ease of use
- Supplied with certificate of quality
- Marked with expiration date and lot number for traceability
- Each box of 25 vials is supplied with a Hanna certificate of quality. The reagents are traceable to NIST SRM® 930

Precision Turbidity Benchtop Meter (EPA Compliant)

HI 88703

Non-ratio Mode Range: 0.00 to 9.99; 10.0 to 40.0 NTU; 0.0 to 99.9; 100 to 268 Nephelos; 0.00 to 9.80 EBC

Ratio Mode Range: 0.00 to 9.99; 10.0 to 99.9; 100 to 4000 NTU; 0.0 to 99.9; 100 to 26800 Nephelos; 0.00 to 9.99; 10.0 to 99.9; 100 to 980 EBC

The **HI 88703** Precision Turbidity Benchtop Meter is specially designed for water quality measurements, providing reliable and accurate readings, especially in the low turbidity range.

- Backlit graphic LCD display
- Ratio and non-ratio measurement modes.
- Normal, continuous, or signal averaging measurement reading modes available.
- Turbidity can be read as Nephelometric Turbidity Units (NTU), European Brewing Convention units (EBC), or Nephelos units.
- GLP data
- AMCO AEPA-1 primary turbidity standard
- USB for data transfer
- Data logging - Up to 200 measurements

Turbidity Meter (EPA Compliant)

HI 98703

FastTracker™ location traceability

Range: 0.00 to 9.99 NTU; 10.0 to 99.9 NTU; 100 to 1000 NTU

The **HI 98703** Precision Turbidity Portable Meter is specially designed for water quality measurements, providing reliable and accurate readings, especially in the low turbidity range. The instrument is based on a state-of-the-art optical system which guarantees accurate results, assures long term stability, and minimizes stray light and color interferences.

- EPA Compliant Measurement
- Fast Tracker™ - Tag Identification System (T.I.S)
- Operates on batteries or line voltage
- Backlit LCD display
- GLP data
- AMCO AEPA-1 primary turbidity standard
- USB for data transfer
- Data logging - Up to 200 measurements

Fast Tracker™ — Tag Identification System

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

Portable Photometers

HI 97701
Free Chlorine
Range: 0.00 to 5.00 mg/L (as Cl_2)

HI 97711
Free and Total Chlorine
Range: 0.00 to 5.00 mg/L (as Cl_2)

HI 97713
Phosphate Low Range
Range: 0.00 to 2.50 mg/L (as PO_4^{3-})

HI 97718
Iodine
Range: 0.0 to 12.5 mg/L (ppm) (as I_2)

Iodine

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

HI 97735
Portable Total Hardness
LR Range: 0 to 250 mg/L (as $CaCO_3$)
MR Range: 200 to 500 mg/L (as $CaCO_3$)
HR Range: 400 to 750 mg/L (as $CaCO_3$)

HI 97753
Chloride
Range: 0.0 to 20.0 mg/L (ppm) (as Cl-)

HI 97761
Total Chlorine Ultra-Low-Range
Range: 0.000 to 0.500 mg/L (ppm) (as Cl_2)

HI 97771
Free Chlorine & Ultra High Range Total Chlorine
Range: 0.00 to 5.00 mg/L (as Cl_2)

Photometers - Checker® HC

HI 701
Free Chlorine
Range: 0.00 to 2.50 ppm

HI 711
Total Chlorine
Range: 0.00 to 3.50 ppm

HI 713
Phosphate Low-Range
Range: 0.00 to 2.50 ppm

HI 718
Iodine
Range: 0.0 to 12.5 ppm

HI 759
Maple Syrup Digital Grader
Range: 0 to 100% transmittance

HI 761
Total Chlorine Ultra-LowRange
Range: 0 to 500 ppb

HI 771
Total Chlorine Ultra-High Range
Range: 0 to 500 ppm

Maple Syrup Season

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

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

Digital Refractometers for Sugar Analysis

HI 96800
for Refractive Index and Brix

- 1.3300 to 1.5080 Refractive Index range with ±0.0005 accuracy
- 0 to 85% Brix range with ±0.2% accuracy

HI 96801
for Brix Analysis in Foods

- Temperature Compensation algorithms based on sucrose solution
- 0 to 85% Brix range with an accuracy of ± 0.2%

HI 96802
for % Fructose by Weight Analysis

- Temperature Compensation algorithms based on fructose solution
- 0 to 85% fructose by weight range with an accuracy of ± 0.2%

HI 96803
for % Glucose by Weight Analysis

- Temperature Compensation algorithms based on glucose solution
- 0 to 85% glucose by weight range with an accuracy of ± 0.2%

HI 96804
for % Invert Sugar by Weight Analysis

- Temperature Compensation algorithms based on invert sugar solution
- 0 to 85% invert sugar by weight range with an accuracy of ± 0.2%

Digital Sodim Chloride Refractometers

HI 96821
for Measuring Sodium Chloride in Food

- Sample size as small as 2 metric drops (100 µl)
- Sealed stainless steel well with high-grade optical prism made of flint glass
- Fast 1.5 second response time for temperature compensated readings

Portable Foodcare pH / Temperature Meters for Food

HI 98161

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98161** is a rugged, waterproof, portable pH meter that measures pH and temperature using the specialized **FC 2023** Foodcare pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Supplied with **FC 2023** Foodcare pH/Temperature electrode
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button

HI 99161

pH* Range: -2.0 to 16.0 pH; -2.00 to 16.00 pH

The **HI 99161** is a Foodcare portable, pH and temperature meter designed specifically for dairy applications. Monitoring pH in dairy processes is critical to ensure the quality of dairy products. The **FC 2023** 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 **FC 2023** uses a free diffusion sleeve type reference junction which prevents the typical problems of clogging in viscous liquids such as milk or condiments.

- Supplied with **FC 2023** Foodcare pH/Temperature electrode
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration
- Waterproof

(*) Limits will be reduced to actual probe/sensor limits

pH in Milk

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

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

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

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

Measuring the pH of milk can provide a number of challenges. Milk products tend to have a high solids content that will coat the sensitive glass membrane surface and/or clog the reference junction. The **FC 1013** supplied with the **HI 98162** is specifically designed for measuring pH in milk. The Polyvinylidene fluoride (PVDF) body is a food grade plastic that is resistant to most chemicals and solvents, including sodium hypochlorite. It has high abrasion resistance, mechanical strength and resistance to ultraviolet and nuclear radiation. PVDF is also resistant to fungal growth. The **FC 1013** is an ideal general-purpose pH electrode for milk products that connects to the **HI 98162** with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

Portable Foodcare pH / Temperature Meters for Milk

HI 98162

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98162** is a rugged, waterproof, Foodcare portable pH meter that measures pH and temperature using the specialized **FC 1013** probe for milk products. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Supplied with **FC 1013** milk pH/Temperature electrode
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button

HI 99162

pH* Range: -2.0 to 16.0 pH; -2.00 to 16.00 pH

The Hanna Instruments **HI 99162** is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for milk analysis.

- Supplied with **FC 1013** milk pH/Temperature electrode
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration

(*) Limits will be reduced to actual probe/sensor limits

Monitoring pH in the Meat Industry

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

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

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

Portable Foodcare pH / Temperature Meters for Meat

HI 98163

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98163** is a rugged, waterproof, portable pH meter that measures pH and temperature using the specialized **FC 2323** Foodcare pH electrode with AISI stainless steel piercing blade. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Supplied with **FC 2323** meat pH/Temperature electrode
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button

HI 99163

pH* Range: -2.0 to 16.0 pH; -2.00 to 16.00 pH

The Hanna Instruments **HI 99163** is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for meat analysis.

The **HI 99163** uses the PVDF body **FC 2323** amplified pH electrode that offers numerous features to improve pH testing for meat processors. The probe comes with the **FC 099** removable stainless steel blade to help users perform non-intrusive measurements of meat products, inside and out. The free diffusion junction helps to avoid a clogged reference and the external body material is non-toxic and food compatible.

- Supplied with **FC 2323** meat pH/Temperature electrode
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration

(*) Limits will be reduced to actual probe/sensor limits

pH in Yogurt

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

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

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

Yogurt can provide a number of challenges for the person that needs to measure pH. Yogurt is a semi-solid to slurry that has a very high solids content. This type of sample will coat the sensitive glass membrane surface and/or clog the reference junction. The **FC 2133** that is supplied with the **HI 98164** is designed specifically for measuring pH in yogurt. From a conic tip shape for easy penetration to an open junction that resist clogging; the **FC 2133** is an ideal general-purpose pH electrode for yogurt products. The **FC 2133** connects to the **HI 98164** with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

Portable Foodcare pH / Temperature Meters for Yogurt

HI 98164

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98164** is a rugged, waterproof, Foodcare portable pH meter that measures pH and temperature using the specialized **FC 2133** yogurt pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Supplied with **FC 2133** yogurt pH/Temperature electrode
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button

HI 99164

pH* Range: -2.0 to 16.0 pH; -2.00 to 16.00 pH

The Hanna Instruments **HI 99164** is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for yogurt analysis. The **HI 99164** uses the **FC 2133** glass body, amplified pH electrode that offers numerous features that improve pH testing for yogurt producers.

- Supplied with **FC 2133** yogurt pH/Temperature electrode
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration

(*) Limits will be reduced to actual probe/sensor limits

pH in Cheese

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

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

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

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

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

Cheese products can provide a number of challenges for the person that needs to measure pH. Cheese products tend to be solid to semi-solids. Both types of samples will coat the sensitive glass membrane surface and/or clog the reference junction. The **FC 2423** that is supplied with the **HI 98165** is designed specifically for measuring pH in cheese. From a conic tip shape in a durable 5 mm diameter stainless steel body for easy penetration into cheese without leaving a large hole to an open junction that resist clogging; the **FC 2423** is an ideal general-purpose pH electrode for cheese. The **FC 2423** connects to the **HI 98165** with a quick-connect, waterproof DIN connector, allowing for a secure, non-threaded attachment.

Portable Foodcare pH / Temperature Meters for Cheese

HI 98165

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98165** is a rugged, waterproof, portable Foodcare pH meter that measures pH and temperature using the specialized **FC 2423** cheese pH electrode. This pH meter meets the FDA Food Safety Modernization Act (FSMA) compliance standards.

- Supplied with **FC 2423** cheese pH/Temperature electrode
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button

HI 99165

pH* Range: -2.0 to 16.0 pH; -2.00 to 16.00 pH

The Hanna Instruments **HI 99165** is a durable, waterproof, and portable Foodcare pH and temperature meter designed specifically for cheese analysis.

- Supplied with **FC 2423** cheese pH/Temperature electrode
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration

(*) Limits will be reduced to actual probe/sensor limits

Portable Foodcare pH / Temperature Meters for Beer

HI 98167

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98167** is a rugged, waterproof, portable pH meter that measures pH and temperature during the brewing process. Idealy for measure the pH of mash, cooled wort and finished product.

- Waterproof
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button
- Supplied with a specialized titanium body **FC 2143** amplified pH electrode with built-in temperature

HI 99151

pH* Range: -2.00 to 16.00 pH / -2.0 to 16.0 pH

The Hanna Instruments **HI 99151** is a durable, waterproof, and portable pH and temperature meter designed specifically for beer analysis. It is supplied with the **FC 2143** rugged double junction pH electrode with a flat pH sensor profile, cloth reference junction, and titanium body perfect for brewing operations.

- Waterproof
- Quick Connect DIn Connector
- Automatic Temperature Compensation
- Automatic Two-Point Calibration
- Supplied with a specialized **FC 2143** amplified pH electrode with built-in temperature

(*) Limits will be reduced to actual probe/sensor limits
The **FC 2143** is limited to be used from 0 to 12 pH and from 0 to 80°C temperature (32 to 176°F)

Portable Foodcare pH / Temperature Meters for Wine

HI 98169

pH* Range: -2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH

The **HI 98169** is a rugged, waterproof, portable pH meter that measures pH and temperature of must in winemaking. This meter is supplied with a specialized pH probe that features an open junction with Clogging Prevention System (CPS™) technology. This electrode provides a fast stable response and resists clogging. The electrolyte solution in the electrode is refillable.

- Waterproof
- CAL Check™ feature
- Quick Connect DIn Connector
- USB Connection for Data Transfer
- Dedicated Help Button
- Supplied with a specialized glass body **FC 10483** pH electrode with Clogging Prevention System (CPS™) technology

Clogging Prevention System (CPS™)

HI 99111

pH* Range: -2.00 to 16.00 pH / -2.0 to 16.0 pH

HI 99111 is a portable, microprocessor-based pH and temperature meter. Main features include: extended pH and temperature ranges; waterproof and compact casing; large dual-line display; low battery detection; automatic pH calibration at one or two points within two memorized buffer sets (standard or NIST); selectable temperature unit (°C or °F). This meter is supplied with a specialized glass body **FC 10483** pH probe that features an open junction with Clogging Prevention System (CPS™) technology.

- Waterproof
- Automatic Two-Point Calibration
- Supplied with a specialized glass body **FC 10483** pH electrode with Clogging Prevention System (CPS™) technology

(*) Limits will be reduced to actual probe/sensor limits
The **FC 10483** is limited to be used from 0 to 12 pH and from 0 to 80°C temperature (32 to 176 °F)

Portable Foodcare pH / Temperature Meters for Drinking Water

HI 99192

pH* Range: -2.00 to 16.00 pH / -2.0 to 16.0 pH

The **HI 99192** is ideal for on-site spots checks of drinking water. The pH of potable water is fundamental to ensure safe water quality. If pH is too low, drinking water will be corrosive to the distribution system & water pipes in homes. If pH is too high, it can reduce the effectiveness of disinfectants.

The pH of water also influences aesthetic or cosmetic properties including taste, odor, and clarity. Most public water operations maintain pH between 6.5 & 8.5.

The **HI 99192** drinking water pH meter uses the glass body **FC 2153** 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.

- Waterproof
- Automatic Temperature Compensation
- Automatic Two-Point Calibration
- Durable IP67 waterproof casing
- Watertight probe connection
- Probe condition indicator
- On-screen calibration tags
- mV measurement for electrode check
- Selectable temperature unit (°C or °F)
- Auto-off function
- Battery life indication and low battery detection
- Supplied with a **FC 2153** amplified pH electrode with built-in temperature sensor

Triple Ceramic Junction

(*) The **FC 2153** is limited to be used from 0 to 12 pH and from 0 to 70 °C temperature (32 to 158 °F)

Professional Waterproof Meters

HI 98192

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

EC Range:	0 to 400 mS/cm (shows values up to 1000 mS/cm actual conductivity)** 0.001 to 9.999 µS/cm*; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (autoranging)
TDS Range:	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
Resistivity Range:	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm* (autoranging)
Salinity Range:	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
Tempe.† Range:	-20.0 to 120.0°C (4.0 to 248.0°F)

HI 98192 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.000 µS/cm to 400 mS/cm, as well as TDS, resistivity and three salinity scales. This meter offers a quick connect four-ring probe and allows the user to adjust the nominal cell constant. **HI 98192** is also ready to perform all three stages of USP <645> method required for EC measurement of ultrapure water.

The **HI 98192** is supplied complete with all accessories to perform an EC/TDS/ Resistivity/Salinity measurement packaged into a durable carrying case.

- Waterproof
- Salinity readings
- Calibration
- Durable IP67 rated waterproof casing
- Temperature compensation
- Four-ring stainless steel probe
- Clear display
- Dot matrix display with multifunction virtual keys
- AutoHold
- Calibration timeout
- Connectivity
- GLP
- Approximately 100 hour battery life
- Intuitive keypad
- Supplied complete

Quick Connect

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

Optical Dissolved Oxygen Meter

opdo™

HI 98198

Professional Dissolved Oxygen Measurement with Digital Optical Probe

Dissolved Oxygen Range: 0.00 to 50 mg/L (ppm); 0.0 to 500.0% saturation
Atmospheric Pressure Range: 420 to 850 mmHg
Temperature Range: -5.0 to 50.0°C; -4.0 to 248.0°F

The **HI 98198** opdo™ meter is a rugged, portable dedicated dissolved oxygen (DO) meter designed for fresh and saltwater measurements of dissolved oxygen. This professional, waterproof meter complies with IP67 standards and measures DO, barometric pressure, and temperature. The **HI 98198** is supplied with a **HI 764113** digital optical dissolved oxygen probe in a custom thermoformed durable carrying case with accessories. It is compact and ergonomically designed to provide ready access to the materials required for routine sampling.

Design Features

- Digital optical probe with Quick Connect
- IP67 rated waterproof, rugged enclosure
- Clear, dot matrix display with multifunction virtual keys
- Dedicated HELP key

Technical Features

- Percent saturation or concentration measurements (mg/L)
- Automatic temperature compensation with one-point temperature calibration
- Salinity compensation
- Calibration timeout
- Built-in calculations
  - Biochemical Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR) modes.
- Built-in barometer
- Data logging capability
- GLP
- PC connectivity via opto-isolated USB Type-C
- Displays temperature in °C or °F
- Approximately 200 hours of continuous use using 4 AA batteries

HI 764113 Rugged Optical Dissolved Oxygen Probe

- Digital, weighted probe
- No membranes
- No electrolytes
- No oxygen consumption
- No flow dependence or minimum flow rate
- Fast and stable readings
- Not affected by sunlight
- Factory-calibrated "Smart Cap"
- Smart Caps last one year
- Minimal maintenance

Chemical Test Kits

HI 3811
Alkalinity Test Kit
Range: 0 to 100 mg/L (ppm) $CaCO_3$
or 0 to 300 mg/L $CaCO_3$

HI 3815
Chloride Test Kit
Range: 0 to 100 mg/L Cl^- and 0 to 1000 mg/L Cl^-

HI 3831F
Free Chlorine Test Kit
Range: 0.0 to 2.5 mg/L (ppm)

HI 3875
Free Chlorine Medium Range Test Kit
Range: 0.0 to 3.5 mg/L (ppm)

Chlorine

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

HI 38018
Free Chlorine Low Range and Medium Range Test Kit with Checker® disc
Range: 0 to 0.7 mg/L and 0 to 3.5 mg/L

HI 38020
Free and Total Chlorine Low Range, Medium Range & High Range Test Kit
Range: 0.00 to 0.70 mg/L, 0.0 to 3.5 mg/L, and 0.0 to 10.0 mg/L

HI 3810
Dissolved Oxygen Test Kit
Range: 0 to 10 mg/L Ol_2 range

Dissolved Oxygen in Fruit Juice

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

Chemical Test Kits

HI 3812
Total Hardness Test Kit
Range: 0.0 to 30.0 mg/L and 0 to 300 mg/L

HI 3840
Total Hardness LR Test Kit
Range: 0 to 150 mg/L range

HI 3841
Total Hardness MR Test Kit
Range: 40 to 500 mg/L (ppm)

HI 3842
Total Hardness HR Test Kit
Range: 400 to 3000 mg/L (ppm)

HI 38033
Total Hardness Test Kit (gpg)
Range: 0 to 30 grains per gallon (gpg)

Water Hardness & Clean-In-Place (CIP) Systems

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

HI 38054
Ozone Test Kit
Range: 0.0 to 2.3 mg/L

Ozone

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

HI 3822
Sulfite Test Kit
Range: 0 to 20 mg/L and
0 to 200 mg/L Na_2SO_3

HI 3833
Phosphate Test Kit
Range: 0 to 5 mg/L (ppm)

HI 3843
(Bleach) Hypochlorite Test Kit
Range: 50 to 150 g/L Cl_2

HI 3844
Hydrogen Peroxide Test Kit
Range: 0.00 to 2.00 mg/L and 0.0 to 10.0 mg/L

Chemical Test Kits

HI 3812
Total Hardness Test Kit
Range: 0.0 to 30.0 mg/L and 0 to 300 mg/L

HI 3840
Total Hardness LR Test Kit
Range: 0 to 150 mg/L range

HI 3841
Total Hardness MR Test Kit
Range: 40 to 500 mg/L (ppm)

HI 3842
Total Hardness HR Test Kit
Range: 400 to 3000 mg/L (ppm)

HI 38033
Total Hardness Test Kit (gpg)
Range: 0 to 30 grains per gallon (gpg)

Water Hardness & Clean-In-Place (CIP) Systems

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

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Ozone Test Kit
Range: 0.0 to 2.3 mg/L

Ozone

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

HI 3822
Sulfite Test Kit
Range: 0 to 20 mg/L and
0 to 200 mg/L Na_2SO_3

HI 3833
Phosphate Test Kit
Range: 0 to 5 mg/L (ppm)

HI 3843
(Bleach) Hypochlorite Test Kit
Range: 50 to 150 g/L Cl_2

HI 3844
Hydrogen Peroxide Test Kit
Range: 0.00 to 2.00 mg/L and 0.0 to 10.0 mg/L

pH Electrodes

FC 098 (20mm) FC 099 (35mm)
for Meat Penetration

- Made of high grade stainless steel for long life
- Razor sharp for easy piercing into meat & semi-solids
- Protects glass pH electrode from breakage

FC 100B
for Food Industry (General Use) and Milk

- Range: pH 0 to 13
- With BNC Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 70°C

FC 200B
for Dairy Products & Semi-Solid Foods

- Range: pH 0 to 12
- With BNC Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 50°C

FC 210B
for Yogurt and Creams

- Range: pH 0 to 12
- With BNC Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 220B
for Creams, Fruit Juices & Sauces

- Range: pH 0 to 12
- With BNC Connector
- Glass body foodcare pH electrode
- Operating temperature range from -5 to 70°C

FC 230B
for Meat & Semi-Frozen Products

- Range: pH 0 to 12
- With BNC Connector
- PVDF body foodcare pH electrode
- Operating temperature range is from 0 to 50°C

FC 240B
for Cheese and Penetration

- Range: pH 0 to 13
- With BNC Connector
- Titanium body foodcare pH electrode
- Operating temperature range from 0 to 50°C

FC 1013
for Food Industry (General Use) and Milk

- Range: pH 0 to 13
- With Quick Connect DIN Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 80°C

FC 2020
for Dairy Products

- Range: pH 0 to 12
- With BNC Connector
- Digital PVDF body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2023
for Cheese, Yogurt, Meat, Semi-Solid Foods, Fruits, Ham and Sausages

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2053
for Cheese, Yogurt, Meat, Semi-Solid Foods, Fruits, Ham and Sausages

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2100
for Dairy Products

- Range: pH 0 to 12
- Digital glass body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2133
for Yogurt and Creams

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- Glass body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2320
for Meat and Semi-Frozen Products

- Range: pH 0 to 12
- Digital PVDF body foodcare pH electrode
- Operating temperature range from 0 to 60°C

FC 2323
for Meat and Semi-Frozen Products

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- PVDF body foodcare pH electrode
- Operating temperature range from 0 to 50°C

FC 2423
for Cheese and Penetration

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- Titanium body foodcare pH electrode
- Operating temperature range from 0 to 50°C

HI 1053B
for Fats & Creams, and Semi-Solid Products

- Range: pH 0 to 12
- With BNC Connector
- Glass body foodcare pH electrode
- Operating temperature range from -5 to 70°C

HI 10530
for Fats & Creams, and Semi-Solid Products

- Range: pH 0 to 12
- With BNC Connector
- Digital glass body foodcare pH electrode
- Operating temperature range from -5 to 70°C

HI 10533
for Fats & Creams, and Semi-Solid Products

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- Glass body foodcare pH electrode
- Operating temperature range from -5 to 70°C

HI 1131B
for Laboratory Samples, Beer and other Liquid Samples

- Range: pH 0 to 14
- With BNC Connector
- High temperature (HT) glass
- Operating temperature range from 0 to 100°C

HI 11310
for Laboratory General Purpose, Beer

- Range: pH 0 to 14
- With 3.5 mm connector
- Digital Glass Body pH Electrode
- Operating temperature range from 0 to 100°C

HI 11313
for Laboratory General Purpose, Beer

- Range: pH 0 to 14
- With Quick Connect DIN Connector
- Refillable Glass Body pH Electrode
- Operating temperature range from 0 to 100°C

HI 1230B
for Laboratory (General Use)

- Range: pH 0 to 12
- With BNC Connector
- Gel filled PEI body pH electrode
- Operating temperature range from -5 to 70°C

HI 12300
for field and industrial applications

- Range: pH 0 to 12
- With BNC Connector
- Digital PEI body pH electrode
- Operating temperature range from -5 to 70°C

HI 12303
for field and industrial applications

- Range: pH 0 to 12
- With Quick Connect DIN Connector
- Gel filled PEI body pH electrode
- Operating temperature range from -5 to 70°C

Combination Ion Selective Electrodes

FC 300B
Sodium Combination ISE

- With BNC Connector
- Optimum pH range: 9.75 to 14 pH
- Measurement range: 1M to $1 \cdot 10^{-5}$M; 22990 to 0.23 ppm
- Temperature range: 0 to 80°C
- Refillable glass body sodium ion selective electrode

Sodium in Foods and Beverages

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

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

HI 4102
Bromide Combination ISE

- With BNC Connector
- Optimum pH range: 2 to 12.5
- Measurement range: 1M to $1 \cdot 10^{-6}$M; 79910 to 0.08 mg/L (ppm)
- Temperature range: 0 to 80°C
- PEI glass body ion selective electrode

HI 4104
Calcium Combination ISE

- With BNC Connector
- Optimum pH range: 4 to 10
- Measurement range: $1 \cdot 10^{-2}$M to $1 \cdot 10^{-4}$M; 440 to 4.4 mg/L (ppm)
- Temperature range: 0 to 40°C
- PEI/PVC body ion selective electrode

Calcium

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

HI 4107
Chloride Combination ISE

- With BNC Connector
- Optimum pH range: 2 to 11
- Measurement range: 1M to $5 \cdot 10^{-2}$M; 35500 to 1.8 mg/L (ppm)
- Temperature range: 0 to 80°C
- PEI body ion selective electrode

HI 4111
Iodide Combination ISE

- With BNC Connector
- Optimum pH range: 2 to 13
- Measurement range: 1M to $1 \cdot 10^{-7}$M; 127000 to 0.01 mg/L (ppm)
- Temperature range: 0 to 80°C
- PEI body ion selective electrode

Combination Ion Selective Electrodes

HI 4113
Nitrate Combination ISE

- With BNC Connector
- Optimum pH range: 3.0 to 8
- Measurement range: 1.0M to $1 \cdot 10^{-5}$M ; 6200 to 0.62 mg/L (ppm) ; 1400 to 0.4 mg/L (ppm) as N
- Temperature range: 0 to 40°C
- PEI/PVC body ion selective electrode

Nitrate

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

HI 4114
Potassium Combination ISE

- With BNC Connector
- Optimum pH range: 1.5 to 12.0
- Measurement range: 1.0M to $1 \cdot 10^{-5}$M ; 39100 to 0.039 mg/L (ppm)
- Temperature range: 0 to 40°C
- PEI/PVC body ion selective electrode

Potassium in Foods and the Potassium ISE

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

HI 4115
Silver/Sulfide Combination ISE

- With BNC Connector
- Optimum pH range: Ag^+ 2 to 8
  $S^=$ 12 to 14
- Measurement range: $1Ag^+$ 1.0M to $1 \cdot 10^{-5}$M ; 107900 to 0.11ppm ; S^{2-} 1.0M to $1 \cdot 10^{-7}$M ; 32100 to 0.003 ppm
- Temperature range: 0 to 80°C
- PEI body ion selective electrode

Foodcare Thermistor Probes

FC 762PW

Foodcare Penetration Probe
for General Purpose

Temp. Range: -50 to 150°C (-58 to 302°F)

Sensor	: NTC Thermistor
Probe Dimensions	: L 100 mm x Dia 3 mm (3.9 x 0.12")
Probe Material	: AISI 316 stainless steel
Probe Handle	: Polypropylene (PP)
Probe Handle	: Color white
Cable Type	: PVC/straight
Cable Length	: white / 2 m (6.6')

FC 762W1/2

Foodcare Wire Probe Designed
for Liquid Immersion

Temp. Range: -50 to 150°C (-58 to 302°F)

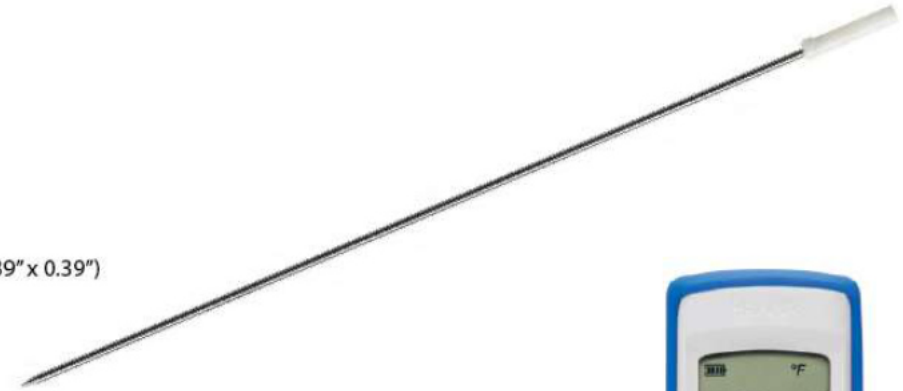
Sensor	: NTC Thermistor
Probe Dimensions	: L 50 mm x Dia 3.6 mm (2" x 0.14")
Probe Material	: AISI 316 stainless steel
Cable Type	: PVC/straight
Cable Length	: White / 2 m (6.6')

• Probe does not incorporate a handle

FC 762N2

Foodcare Probe
for Tanks, Vessels and Vats

Temp. Range: -50 to 150°C (-58 to 302°F)



Sensor	: NTC Thermistor
Probe Dimensions	: L 1000 mm x 10 mm (39" x 0.39")
Probe Material	: Stainless steel
Probe Handle	: PVDF
Probe Handle	: Color white
Cable Type	: PVC/straight
Cable Length	: White / 2 m (6.6')

HI 935012 Brewing Thermometer is supplied with **FC 762N2** (1 m stainless steel probe)

Foodcare K-Type Thermocouple Probes

FC 766PW

Foodcare Penetration Probe

Max. Temperature: 300°C (570°F)

Probe Dimensions : L 120 mm x Dia 3 mm (4.7 x 0.12")
Probe Material : Stainless steel
Probe Handle : Polypropylene (PP)
Cable Length : 1 m (3.3')

FC 766C1

Foodcare Ultra-fast Probe

Max. Temperature: 300°C (570°F)

Probe Dimensions : L 100 mm x Dia 3 mm (3.9 x 0.12")
Probe Material : AISI 316 Stainless steel
Probe Handle : Polypropylene (PP)
Cable Length : 1 m (3.3')

FC 766TR2

Foodcare Penetration Probe
for Semi-Solid Samples

Temperature Range: -40 to 250°C (-40 to 482°F)

Probe Dimensions : L 1000 mm x Dia 10 mm (3.3' x 0.39")
Probe Material : Stainless steel
Probe Handle : Stainless steel
Cable Length : 2 m (6.6')

Foodcare K-Type Thermocouple Extensions & Probe

FC 766EX
Foodcare Extension Cable

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

Cable Length : 1 m (3.3')

FC 766HD
Foodcare Probe Handle

A rugged, PVC handle with a 1 meter (3.3') cable.It is provided with a female connector, which allows the connection of any **FC 766Px** probe.

Probe Handle : Polypropylene (PP)
Cable Length : 1 m (3.3')

FC 766PF1
Foodcare Stainless Steel Probe with Exposed Sensor

Temperature Range: -40 to 300°C

The **FC 766PF1** is a K-type thermocouple temperature probe that is ideal for measuring samples at very high temperatures, such as in industrial applications and is recommended to be used with the **FC 766HD** probe handle and/or **FC 766EX** extension cable.

Probe Dimensions : L100mm x Dia 1.5mm
Probe Material : Stainless steel
Sensor : Exposed wires

• Probe does not incorporate a handle

Foodcare K-Type Thermocouple Probes for Specific Applications

FC 766F
Foodcare Wire Probes
for Hard to Reach Places

Temperature Range: -40 to 400°C (-40 to 752°F)

Probe Dimensions : Dia 2 mm (0.08")
Cable Type : Fiberglass insulated/straight
Sensor : Exposed wires
Code / Cable Length : **FC 766F/1** / 1 m (3.3')
FC 766F/3 / 3 m (9.9')
FC 766F/5 / 5 m (16.4')
FC 766F/10 / 10 m (33')
FC 766F/20 / 20 m (66')

FC 766Y
Foodcare Wire Probes
for Ovens and Furnaces

Temperature Range: -40 to 1000°C (-40 to 1832°F)

Probe Dimensions : L 1000 mm x Dia 1.5 mm (39" x 0.06")
Probe Material : Stainless steel
Cable Type : Stainless steel/straight
Code / Cable Length : **FC 766Y/1** / 1 m (3.3')
FC 766Y/2 / 2 m (6.6')
FC 766Y/3 / 3 m (9.9')
FC 766Y/5 / 5 m (16.4')
FC 766Y/8 / 8 m (26')
FC 766Y/10 / 10 m (33')

Foodcare **K-Type** Thermocouple Probes for Specific Applications

FC 766W1

Foodcare Wire Probes with Insulated Cable

Temperature Range: -40 to 120°C

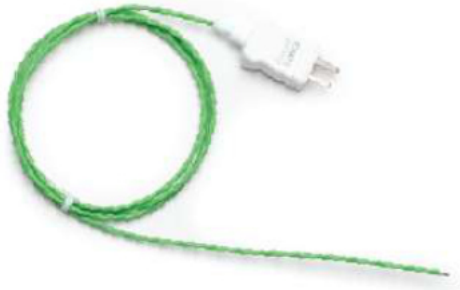
Probe Dimensions	: L 44 mm x Dia 5mm (1.7" x 0.2")
Probe Material	: Stainless steel
Cable Type	: Polyurethane (PUR)/straight
Code / Cable Length	: **FC 766W1/1** / 1 m (3.3')
	FC 766W1/3 / 3 m (9.9')
	FC 766W1/5 / 5 m (16.4')
	FC 766W1/10 / 10 m (33')

FC 766TZ

Foodcare Wire Stainless Steel Probes
for Sous Vide

Temperature Range: -40 to 200°C

Cable Type	: PTFE Insulated/straight
Sensor	: Stainless steel
Cable Length	: 1 m (3.3')
Code / Probe Dimensions	: **FC 766TZ/30** / L 30 mm x Dia 1 mm (1.18" x 0.04")
	FC 766TZ/60 / L 60 mm x Dia 1 mm (2.36" x 0.04")
	FC 766TZ/120 / L 120 mm x Dia 1 mm (4.7" x 0.04")



FC 766T

Foodcare Wire Probes
for Hard to Reach Places

Temperature Range: -40 to 250°C (-40 to 482°F)

Probe Dimensions	: Dia 1.9 mm (0.07")
Cable Type	: PTFE Insulated/straight
Sensor	: Exposed wires
Code / Cable Length	: **FC 766T/1** / 1 m (3.3')
	FC 766T/3 / 3 m (9.9')
	FC 766T/5 / 5 m (16.4')
	FC 766T/7 / 7 m (23')
	FC 766T/10 / 10 m (33')

FC 766TZ2

Foodcare Wire Stainless Steel Penetration Probe

Temperature Range: -40 to 600°C

Probe Dimensions	: L 185 mm x Dia 1.8 mm (7.2" x 0.07")
Cable Type	: Straight
Sensor	: Stainless steel
Cable Length	: 1 m (3.3')

Foodcare T-Type Thermocouple Probes

FC 767PW
Foodcare Penetration Probe

Temperature Range: Max. 300°C (570°F)

Probe Dimensions : L 120 mm x Dia 3 mm (4.7 x 0.12")
Probe Material : Stainless steel
Probe Handle : Polypropylene (PP)
Cable Length : 1 m (3.3')

FC 767C1
Foodcare Ultra-fast Probe

Temperature Range: Max. 300°C (570°F)

Probe Dimensions : L 100 mm x Dia 3 mm (3.9 x 0.12")
Probe Material : AISI 316 Stainless steel
Probe Handle : Polypropylene (PP)
Cable Length : 1 m (3.3')

FC 767TR2
Foodcare Penetration Probe
for Semi-Solid Samples

Temperature Range: -40 to 250°C (-40 to 482°F)

Probe Dimensions : L 1000 mm x Dia 10 mm (39" x 0.4")
Probe Material : Stainless steel
Probe Handle : Stainless steel
Cable Length : 2 m (6.6')

Foodcare T-Type Thermocouple Probes for Specific Applications

FC 767W1/1
Foodcare Wire Probe with Insulated Cable

Temp. Range: -40 to 120°C

Probe Dimensions : L 44 mm x Dia 5mm (1.7" x 0.2")
Probe Material : Stainless steel
Cable Type : Polyurethane (PUR)/straight
Cable Color/Length : White/1 m (3.3')

FC 767F/1
Foodcare Wire Probe
for Hard to Reach Places

Temp. Range: -40 to 400°C (-40 to 752°F)

Probe Dimensions : Dia 2 mm (0.08")
Cable Type : Fiberglass insulated/straight
Sensor : Exposed wire
Cable Length : 1 m (3.3')

FC 767Y/1
Foodcare Wire Probe
for Ovens and Furnaces

Temp. Range: -40 to 1000°C (-40 to 1832°F)

Probe Dimensions : L 1000 mm x Dia 1.5 mm (39" x 0.06")
Probe Material : Stainless steel
Cable Type : Stainless steel/straight
Cable Length : 1 m (3.3')

Titration Solutions and Reagents

HI 70441	Iodine stabilized solution (0.04 N), 1 L
HI 70443	Sulfuric acid solution (10%), 500 mL
HI 70444	Sulfuric acid solution (25%), 500 mL
HI 70445	Nitric acid solution (1 M), 500 mL
HI 70446	Fehling solution A, 500 mL
HI 70447	Fehling solution B, 500 mL
HI 70448	Silver nitrate solution (0.02 M), 1 L
HI 70449	EDTA solution (0.02 M), 1 L
HI 70453	Hydrochloric acid solution (0.02 N), 1 L
HI 70454	Sodium hydroxide solution (0.02 N), 1 L
HI 70455	Sodium hydroxide solution (0.01 N), 1 L
HI 70456	Sodium hydroxide solution (0.1 N), 1 L
HI 70457	Sodium hydroxide solution (1 N), 1 L
HI 70458	Sulfuric acid solution (0.01 M), 1 L
HI 70459	Sulfuric acid solution (0.05 M), 1 L
HI 70462	Hydrochloric acid solution (0.01 N), 1 L
HI 70463	Hydrochloric acid solution (0.1 N), 1 L
HI 70464	Hydrochloric acid solution (1 N), 1 L
HI 70465	Hydrogen peroxide solution (30%), 25 mL
HI 70466	Phenylarsine oxide (PAO) solution (0.00564N), 500 mL
HI 70467	pH 4.18 acetate buffer, 230 mL
HI 70468	Potassium iodide, 35g
HI 70469	Iodine solution (0.00188N), 230 mL (4)
HI 70471	Phenylarsine oxide (PAO) solution (0.000564N), 500 mL
HI 70472	pH 7.15 phosphate buffer solution, 230 mL
HI 70436M	Distilled water, 230 ml

HI 70401 Potassium hydrogen phthalate, 20 g
HI 70402 Tartaric acid, 20 g
HI 70403 Sodium thiosulfate pentahydrate, 20 g
HI 70404 Potassium iodide powder packets, 100 packets
HI 70405 Glucose/fructose, 20 g
HI 70406 Sodium chloride, 20 g
HI 70407 Potassium iodate, 20 g
HI 70408 Oxalic acid, 20 g
HI 70409 Potassium permanganate, 20 g
HI 70422 Silver nitrate (0.1 M), 1L
HI 70423 Sodium hydroxide solution (0.11 N), 1 L
HI 70424 Amino-propanol buffer, 25 mL
HI 70425 Sulfuric acid solution (16%), 500 mL
HI 70426 Glyoxal solution (40%), 100 mL
HI 70427 Nitric acid solution (1.5 M), 500 mL
HI 70428 Sodium hydroxide solution (0.25N), 1 L
HI 70429 Silver nitrate solution (0.05 M), 1L
HI 70432 Hydrogen peroxide solution (3%), 25 mL
HI 70433 Stabilized iodine solution (0.01 N), 1L
HI 70434 Phosphoric acid (85%), 500 mL
HI 70435 Sodium hydroxide solution (5 M), 500 mL
HI 70436 Deionized water, 1 G
HI 70437 Potassium Iodide concentrated (30%) solution, 500 mL
HI 70438 Tris buffer set, 1 L
HI 70439 Sodium thiosulfate solution (0.1 M), 1 L
HI 70440 Iodine stabilized solution (0.02 N), 1 L

pH Buffer Solutions

HI 7004/1L (1 L -bottles)
HI 7004L (500 mL -bottles)
4.01 pH @ 25°C

HI 7007/1L (1 L -bottles)
HI 7007L (500 mL -bottles)
7.01 pH @ 25°C

HI 7010/1L (1 L -bottles)
HI 7010L (500 mL -bottles)
10.01 pH @ 25°C

HI 70004C (20 mL -sachets, 25 pcs)
4.01 pH @ 25°C

HI 70007C (20 mL -sachets, 25 pcs)
7.01 pH @ 25°C

HI 70010C (20 mL -sachets, 25 pcs)
10.01 pH @ 25°C

ORP Test & Pretreatment Solutions

HI 7021L (500 mL -bottles)
240 mV @ 25°C

HI 7022L (500 mL -bottles)
470 mV @ 25°C

HI 7092L (500 mL -bottles)
Oxidizing pretreatment

HI 70022P (20 mL -sachets, 25 pcs)
470 mV @ 25°C

Sample Preparation Solution (30 mL bottle)

HI 70960
for solid/semi-solid samples

Electrode Cleaning Solutions (500 mL bottle)

HI 7061L
for General Purpose

HI 7073L
for Proteins

HI 7074L
for Inorganic Substances

HI 7077L
for Oil and Fats

HI 8061L
for General Purpose

HI 8073L
for Proteins

HI 8077L
for Oil and Fats

HI 70630L
for Meat Grease & Fats

HI 70631L
for Meat Grease & Fats

HI 70635L
for Wine Deposits

HI 70636L
for Wine Stains

HI 70640L
for Milk Deposits

HI 70641L
for Dairy Products

HI 70642L
for Cheese Deposits

HI 70643L
for Yogurt Products

HI 70670L
for Salt Deposits

HI 70682L
for Brewing Deposits

Electrode Cleaning Solutions (20 mL sachet, 25 pcs)

HI 70000P
Rinsing

HI 700601P
General Purpose

HI 700630P
for Meat Grease & Fats

HI 700635P
for Wine Deposits

HI 700636P
for Wine Stains

HI 700640P
for Milk Deposits

HI 700641P
for Dairy Products

HI 700642P
for Cheese Deposits

HI 700643P
for Yogurt Products

HI 700670P
for Salt Deposits

HI 700680P
for Cellulose Deposits

HI 700682P
for Beer and Wort

HI 700683P
for Sushi Rice Deposits

HI 700684P
for Bread & Dough Deposits

HI 700685P
for Chocolate Deposits

Electrode Storage Solutions (500 mL bottle)

HI 70300L
for pH and ORP Electrodes

Electrode Fill Solutions

HI 7072L 1M KNO_3 Potassium Nitrate (500 mL bottle)
HI 7076 1M Sodium Chloride (NaCl) (30 mL x 4 bottles)
HI 7078 0.5M $(NH_4)_2SO_4$ Ammonium Sulfate (30 mL x 4 bottles)

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