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About Thermometers

Precise process control is one of the most important factors in maintaining high quality in production, just as precision and accuracy are the key to research. Temperature is a crucial variable in both production and research.

Glass and metal thermometers use thermal expansion to measure temperature. This method uses a physical law which gives a false sense of reliability, since one assumes the measurement is "true" because he or she can see how it works. This system is no longer suitable for many reasons and their accuracy and range are very limited. Glass construction is fragile and can be dangerous to a person's health, as well as to the environment. For these reasons, an alternative way of measuring temperature has become necessary. Hanna electronic thermometers are designed to withstand mechanical stress and extreme environments while maintaining high accuracy.

Electronic thermometers have provided the versatility, speed and accuracy requested by operators in all areas of temperature measurement. Speed is important when the reactions being monitored change rapidly. Small, compact sensors are preferable for tightly arranged areas, such as electronics and other miniature applications. Electronic thermometers allow users to monitor maximum, minimum and even average temperatures.

Dedicated research teams, precision process control, integrated production facilities and an overall team effort is required to meet the demanding applications of our users. Hanna's extensive professional thermometer line constitutes the true dedication Hanna commits to thermometer design and production.

Measurement Unit

Temperature is one of the most common physical properties in our everyday life. It is defined as the property of a body that determines the transfer of heat to or from other bodies. Physically, temperature affects variations in the macroscopic parameters of a body such as volume and pressure, among others.

The fundamental temperature scale is the absolute, thermodynamic or Kelvin scale. The Kelvin (K) unit of thermodynamic temperature, is the fraction 1/273.16 of thermodynamic temperature of the triple point of water. The triple point of water is a standard fixed point at which ice, liquid water, and water vapor are in equilibrium.

Two empirical temperature scales are in common use: the Celsius and Fahrenheit scales. These scales are based on two fixed points.

The Celsius (formally Centigrade) temperature scale uses the Celsius (°C) units, defined as 1/100th of the difference between the temperature of boiling (100°C) and freezing points (0°C) of water. The relationship between the Kelvin and Celsius scales is given by:

$$K = ^\circ C + 273.15$$

The Fahrenheit scale uses Fahrenheit (°F) units, where the temperature of boiling water is taken at 212°F, and the temperature of the freezing point at 32°F. The scale originally used the temperature of a mixture of ice and common salt as 0°F, and the inventor's approximate body temperature as 96°F. The relationship between the Fahrenheit and Celsius scales is calculated by:

$$^\circ F = ^\circ C \cdot 9/5 + 32$$

Achieving Thermometer Accuracy

Even though it is easy to show resolutions of 0.1°C with digital thermometers, there is no relationship between resolution and accuracy of measurements.

Here is a list of the main causes that can have an effect on accuracy in temperature measurements:

- **Instrument**
 - The instrument may have an extended scale and 19,000 points of measurement may be obtained. Within these 19,000 points, the instrument may perform differently because of internal linearity.
- **Electronic components**
 - The internal electronics have a drift that depends on the ambient temperature. For this reason, the accuracy of the instrument is stated at a specific temperature of 20 or 25°C, and the drift has to be specified for each degree of variation with respect to the reference temperature.
- **LCD**
 - Liquid crystals have an operating limitation which is a function of temperature. Their normal range is between 0 and 50°C, but there are components capable of performing between -20 and 70°C.
- **Batteries**
 - Instrument battery power supply also has limitations of use.
- **Temperature sensor**
 - This is a separate accuracy, which is to be added to the instrument's error.

Also, if the probe supplied is connected to the meter during factory calibration, the probe error is eliminated but will reappear if the probe is replaced.

With all the possible forces influencing accuracy, calibration verification is essential. Hanna's CAL Check™ can verify an accurate calibration quickly and easily.

Importance of Accuracy

Up to a few years ago, accuracy was not a very critical aspect and tolerances of a few degrees did not jeopardize a process. From the time that hazard analysis and critical control points (HACCP) programs became a necessity, measurement accuracy has become a discriminating factor. Due to health risk factors, now an error of a few tenths of a degree can decide whether food can still be kept or must be discarded. In 1990, Hanna began to produce thermometers for our customers' HACCP programs to comply with new governmental regulations. Soon after, Hanna became the market leader in Europe as a result of the technological solutions offered to our users.

User Calibration of Typical Thermometers

To calibrate typical thermometers you need:

- For thermocouple thermometers
 - A simulator of the emf (electromotive force) generated by the thermocouple
- For thermometers with NTC/PTC sensor
 - At least two thermostatic baths
- For Pt100 thermometers
 - A resistance simulator
- For infrared thermometers
 - A heat source (panel) at controlled temperature

Few users can afford this investment in time and materials for checking their thermometers' accuracy. Hanna's exclusive CAL Check is a quick and cost effective way to verify accuracy.

Hanna CAL Check™ Calibration Feature

As previously described, the electronic components of an instrument shift with time. Hanna has made it possible for users, with the simple touch of a button, to verify whether the response of the instrument is within the tolerance limit of $\pm 0.02^\circ\text{C}$.

The CAL Check system acts by substituting the sensor with an internal resistor which corresponds to 0°C ; thus simulates the response that the temperature probe would have at 0°C .

Standardization

Hanna has designed a series of pre-calibrated temperature probes with a maximum error of 2°C for trouble-free replacement.

Thermocouple Thermometer Calibration

Although quite fast, thermocouple thermometers read with a response time much slower than other sensors and technologies. Unfortunately, the measurement of the thermocouple emf (electromotive force) loses accuracy because of the measuring system itself, based on the emf generated by the temperature difference between cold and hot junctions. The same emf may be generated under different conditions, for example:

- Hot junction at 100°C ; cold junction at 20°C ; difference: 80°C
or Hot junction at 90°C ; cold junction at 10°C ; difference: 80°C

A temperature difference of 80°C is obtained with two different temperatures of the sample. It is, therefore, very important to determine the cold junction temperature very precisely. The ability to



do this has a large effect on the accuracy of the measuring system. A thermocouple thermometer is made of two thermometers, one that measures the cold junction, and one for measuring the emf generated by the thermocouple. The cold junction is usually measured with an NTC type sensor, which has response times different from those of the thermocouple. Another crucial point is measuring the actual value of the cold junction, without any environmental influence and dispersions.

To partially solve this problem, Hanna has devised the calibration of the instrument-thermocouple system by dipping the probe in melting ice, thus allowing the user to calibrate the measuring system at 0°C .

Thanks to this solution, it is now possible to use thermocouple thermometers for HACCP controls with an accuracy of $\pm 0.3^\circ\text{C}$, which is the same performance of our Pt100 or NTC thermometers, but with a higher response time.

Calibration Test Keys

To check the calibration status of the instrument, calibrated keys have been prepared in the range from -18 to 70°C . These keys reproduce the value of the sensor at different temperatures. Simply disconnect the measuring probe, replace it with the key and ensure that the instrument reads the simulated value.

Hanna calibrates all thermometers with a standard probe. All NTC temperature probes are inspected and calibrated with standard instruments. During quality inspection, our technicians make sure that the reading errors are within the stated accuracies.

In addition, Hanna provides users with the necessary tools to verify that your thermometers read accurate values. Our complete line of electronic thermometers provides fast and precise measurements down to a tenth of a degree Celsius.

Hanna thermometers may be divided into four main categories: thermistor thermometers, thermocouple thermometers, Pt100 thermometers and infrared thermometers.



Thermistor Thermometers

The thermistor is a semi-conductor device whose resistivity (r) varies as a function of temperature (T):

$$R = R_0 [1 + a(T - T_0)]$$

where

R = resistance of temp. at T **T = temp at the end of measurement**
R₀ = resistance of temp. at T₀ **T₀ = temp at the beginning of measurement**

Temperature resistance coefficient is the parameter that determines if the resistivity variation is positive (as with the Positive Temperature Coefficient, or PTC sensors) or negative (as with the Negative Temperature Coefficient, or NTC thermistors). It is possible to determine the temperature by applying a potential difference and measuring the resistance.

Thermistor sensors are suitable for a temperature range of -50 to 150°C (-58 to 302°F). Higher temperatures may damage the semi-conductor sensor. Accurate temperature measurements are possible (tenths of degree) due to the high sensitivity of the sensor.

Thermocouple Thermometers

The thermocouple consists of the junction of two wires of different metals. At a given temperature, a potential difference results at the opposite extremes of the two wires (Seebeck effect), with the respective variations linearly related within small intervals. It is therefore possible to determine the temperature given the potential difference and characteristics of the two metals. The measurement end of the thermocouple probe is called the hot junction, while the connection of the thermocouple to the meter is the cold junction. An error is introduced as the cold junction is exposed to the ambient temperature. This error can be eliminated by physically putting the cold junction into an ice bath and forcing a reference temperature of 0°C, or by electronically compensating for the cold junction temperature effect. There are various types of thermocouples, identified by an ANSI code using a letter of the alphabet. The K type is the most commonly used thermocouple.

Pt100 Thermometers

The operating principle of resistance thermometers is based on the increase of electric resistance of metal conductors (RTD: Resistance Temperature Detectors) with temperature.

This physical phenomenon was discovered by Sir Humphry Davy in 1821. In 1871, Sir William Siemens described the application of this property using platinum, thereby introducing an innovation in the manufacturing of temperature sensors. Platinum resistance thermometers have been used as an international standard for measuring temperatures between hydrogen triple point at 13.81 K and the freezing point of antimony at 630.75°C (1167.26°F).

Among the various metals to be used in the construction of resistance thermometers, platinum (Pt), a noble metal, is the one that can measure temperatures throughout a wide range; from -251°C (-419.8°F) to 899°C (1650.2°F), with a linear behavior.

Platinum RTD thermometers were common in the seventies but have now been replaced with thermistor sensors because of their smaller dimensions and faster response to temperature changes. The most common RTD sensor using platinum is the Pt100, which means a resistance of 100Ω at 0°C with a temperature coefficient of 0.00385Ω per degree Celsius. For a higher price one can buy platinum sensors with 250, 500 or 1000/(Pt1000).

The main disadvantage of RTD probes is the resistance of the connection cable. This resistance prevents the use of standard two-wire cables for lengths over a few meters, since it affects the accuracy of the reading. For this reason, to obtain high levels of accuracy in industrial and laboratory applications, the use of a three or four-wire system is recommended.

For all its Pt100 thermometers and probes, Hanna has chosen the multiple-wire technology for higher accuracy.

Infrared Thermometers

All objects emit a radiant energy in the infrared (IR) spectrum that falls between visible light and radio waves.

The origins of IR measurements can be traced back to Sir Isaac Newton's prism and the separation of sunlight into colors and electromagnetic energy. In 1800, the relative energy of each color was measured, but it was not until early 20th century that IR energy was quantified. It was then discovered that this energy is proportional to the 4th power of the object's temperature.

IR instrumentation using this formula has been around for over 50 years. They almost exclusively use an optic device that detects the heat energy generated by the object that the sensor is aimed at. This is then amplified, linearized and converted into an electronic signal which in turn shows the surface temperature in Celsius or Fahrenheit degrees.

Infrared measurements are particularly suitable for areas where it is difficult or undesirable to take surface measurements using conventional contact sensors. Applications for IR meters include non-destructive testing of foodstuffs, moving machinery, and high temperature surfaces.



An ideal surface for IR measurements is a black body or radiator with an emissivity of 1.0. Emissivity is the ratio of the energy radiated by an object at a certain temperature to that emitted by a perfect radiator at the same temperature.

The shinier or more polished the surface, the less accurate the measurements. For example, the emissivity of most organic material and rough or painted surfaces is in the 0.95 region and hence, suitable for IR measurements.

On the other hand, surfaces of highly polished or shiny material, such as mirrors or aluminum, may not be appropriate for this application without using some form of filtration. This is due to other factors, namely, reflectivity and transmissivity. The former is a measure of an object's ability to reflect infrared energy while the latter is its ability to transmit it.

Another important and practical concern with IR measurements is the field of view. Infrared meters measure the average temperature of all objects in their field of view. To obtain an accurate result, it is important that the object completely fills the instrument's field of view and there are no obstacles between the meter and the object. The distance-to-target ratio, or the optic coefficient, is therefore an important consideration.



Reference Temperatures

In 1990, NIST established 17 fixed points of the International Temperature Scale (ITS-90) related to reproducible physical phenomena in nature. The ITS-90 Fixed Points are shown in the chart below:

Equilibrium state	K	°C
Vapor pressure point of helium	3 to 5	-270.15 to -268.19
Triple point of hydrogen	13.8033*	-259.346*
Boiling point of hydrogen at a pressure of 33.330.6 Pa	17.042*	-256.108*
Boiling point of equilibrium hydrogen	20.28*	-252.87*
Triple point of neon	27.102	-246.048
Triple point of oxygen	54.361	-218.789
Triple point of argon	83.8058	-189.3442
Triple point of mercury	234.3156	-38.8344
Triple point of water	273.16	0.01
Triple point of gallium	302.9146	29.7646
Melting point of indium	429.7485	156.5985
Melting point of tin	505.078	231.928
Melting point of zinc	692.677	419.527
Melting point of aluminum	933.473	660.323
Melting point of silver	1234.93	961.78
Melting point of gold	1337.33	1064.18
Melting point of copper	1357.77	1084.62



HI148 Series

Waterproof Thermologgers

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

See page 14.42



HI935012

Brewing Thermometer

with 1 m stainless steel probe

See page 14.26

Comparison Guides

	K-type	T-type	K,J,T - type	Range	CAL Button	CAL Check™	PC Compatibility	BEPS	HOLD Feature	Waterproof	Autoranging	Logging	Alarm	Interchangeable Probe	Multiple Channels	Backlit LCD	Foodcare	Page
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Thermocouple Thermometers

HI935005	•			°C/°F				•	•	•				•				14.7
HI935002	•			°C/°F				•	•	•				•	•			14.8
HI93531	•			°C/°F				•	•	•				•				14.9
HI93531N	•			°C/°F	•			•	•	•				•		•		14.9
HI935003	•			°C/°F		•				•				•				14.10
HI935001	•			°C/°F		•				•				•			•	14.30
HI935004		•		°C/°F		•				•				•			•	14.31
HI935007	•			°C/°F		•				•							•	14.34
HI9350011	•			°C/°F		•				•							•	14.32
HI9350041	•			°C/°F		•				•							•	14.33

Thermistor Thermometers

HI93510				°C/°F				•	•	•				•				14.20
HI93510N			•	°C/°F				•	•	•				•		•		14.20
HI935012				°C/°F		•				•				•			•	14.26
HI93501				°C/°F		•				•				•			•	14.28

Temperature Dataloggers

HI148				°C/°F			•	•		•		•	•					14.42
HI144				°C/°F			•					•	•					14.44



HI935005

K-Type Thermocouple Thermometers

- **°C/°F Readout**
 - Measurements can be displayed in either degrees Celsius or Fahrenheit. A simple press of the °C/°F button will switch between the scales.
- **Interchangeable Probes**
 - A wide range of K-type thermocouple probes are available to meet the specific needs of users. Any of the HI766 series of probes can be interchanged with the HI935005 to measure temperature of surfaces, gases, air, liquid, semi-solid samples, and more.
- **High/Low Function**
 - The maximum and minimum temperature values are continuously monitored and displayed on the lower portion of the HI935005 LCD display during a measurement session. The CLR button clears the high and low values on the LCD display.
- **HOLD Function**
 - The HOLD button on the face of the meter freezes the display to allow the user time to record readings. Although the display is frozen, the meter continues to internally monitor the temperature and update the high and low measurement values.
- **Auto Shut-off**
 - Users can select to enable automatic shut off after 8 or 60 minutes of non-use or select to disable the shut-off feature.
- **Battery Error Prevention System (BEPS)**
 - The Battery Error Prevention System detects when the batteries become too weak to ensure reliable measurements.
- **Low Battery Indicator**
 - When the battery level is below 10%, a warning symbol will blink to indicate low battery condition.

The HI935005 is a K-type thermocouple thermometer that can be used with a wide variety of K-type probes. This thermometer offers two measurement ranges from -50.0 to 199.9°C and 200 to 1350°C which can also be displayed in °F (-58.0 to 399.9°F and 400 to 2462°F). With a ±0.2% full scale accuracy, the HI935005 waterproof thermometers are perfectly suited for temperature measurements in the laboratory or the field.

Specifications	HI935005
Range	-50.0 to 199.9°C and 200 to 1350°C; -58.0 to 399.9°F and 400 to 2462°F
Resolution	0.1°C (-50.0 to 199.9°C) and 1°C (outside); 0.1°F (-58.0 to 399.9°F) and 1°F (outside)
Accuracy	±0.2% FS (excluding probe error)
Probe	HI766 series K-type thermocouple (not included)*
Battery Type / Life	1.5V AA (3) / approximately 1600 hours of continuous use; auto-off selectable after 8 or 60 minutes of non-use (can be disabled)
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)
Ordering Information	HI935005 is supplied with batteries and instruction manual.
Probes	HI766C Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
	HI766D Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
	HI766E1 General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
Accessories	HI710007 blue shockproof rubber boot
	HI710008 orange shockproof rubber boot

HI935002

Dual-channel, K-Type Thermocouple Thermometer

- **Multiple input channels**
 - Dual input channels
- **HOLD**
 - HOLD function
- **BEPS**
 - Alerts the user of low battery power that could adversely affect readings
- **Battery indicator**
 - Battery life indicator at startup
- **Waterproof**
 - Compact, heavy-duty and waterproof

HI935002 is a 2-channel, waterproof, K-type thermometer that offers accurate temperature measurements in a wide range, as well as 1600 hours of battery life.

These units display current temperature along with the minimum and maximum temperature for each channel achieved during the measuring session. The difference between each channel can be shown, or a relative value can be set on each channel and variances around that value can be monitored.

The HOLD button freezes the display to allow the user time to record readings.

The instruments are equipped with BEPS (Battery Error Prevention System), which alerts the user in the event that low battery power could adversely affect readings.



Specifications	HI935002
Range	-50.0 to 199.9°C and 200 to 1350°C; -58.0 to 399.9°F and 400 to 2462°F
Resolution	0.1°C (-50.0 to 199.9°C) and 1°C (outside); 0.1°F (-58.0 to 399.9°F) and 1°F (outside)
Accuracy	±0.2% f.s. (for 1 year, excluding probe error)
Probe	HI766 series K-type thermocouple (not included)*
Battery Type / Life	1.5V AA (3) / approx. 1600 hours of continuous use
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)
Ordering Information	HI935002 is supplied with batteries and instructions.
Probes	HI766C Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
	HI766D Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
	HI766E1 General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
Accessories	HI710007 blue shockproof rubber boot
	HI710008 orange shockproof rubber boot

*K-type thermocouple probes should be ordered separately to meet your specific application.



HI93531 · HI93531N

0.1° Resolution K-Type Thermocouple Thermometers

- **HOLD**
 - HOLD function
- **BEPS**
 - Alerts the user of low battery power that could adversely affect readings
- **Battery indicator**
 - Battery life indicator at startup
- **Backlight**
 - Backlit display (N and R versions)
- **Waterproof**
 - Compact, heavy-duty and waterproof
- **Connectivity**
 - PC and printer compatible (R version)

These waterproof thermometers feature 0.1° resolution in the -149.9 to 999.9°C (-24.9 to 999.9°F) range, making them ideal for precise temperature measurements. The instruments display the current temperature along with the minimum and maximum extremes achieved.

The HOLD button freezes the display to allow the user time to record readings. The °C/°F button switches between the Celsius and Fahrenheit temperature scale. The CLR button restarts the evaluation of high and low values.

The HI93531N features a user-activated backlight for low or no light conditions. The CAL button allows a simple one-point calibration in an ice bath at 0°C when probe interchange occurs.

The instruments are equipped with BEPS (Battery Error Prevention System), which alerts the user in the event that low battery power could adversely affect readings.

Specifications	HI93531	HI93531N
Range	-200.0 to 999.9°C; 1000 to 1371°C	-328.0 to 999.9°F; 1000 to 2500°F
Resolution	0.1°C (-149.9 to 999.9°C); 0.2°C (-200.0 to -150.0°C); 1°C (outside)	0.1°F (-24.9 to 999.9°F); 0.2°F (-249.9 to -25.0°F); 0.3°F (-328.0 to -250.0°F); 1°F (outside)
Accuracy	±0.5°C (-100.0 to 999.9°C); ±1°C (outside); ±1°F (-148.0 to 999.9°F); ±1.5°F (outside) (for 1 year, excluding probe error)	
Probe	HI766 series K-type thermocouple (not included)*	
CAL Button	N/A	yes
Backlit LCD	N/A	yes
RS232	N/A	N/A
Battery Type / Life	1.5V AA (3) / approximately 500 hours of continuous use (with backlight off); auto-off after 60 minutes of non-use (can be disabled)	
Environment	-10 to 60°C (14 to 122°F); RH max 100%	
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")	
Weight	235 g (8.3 oz.)	
Ordering Information	HI93531 and HI93531N are supplied with batteries and instructions.	
Probes*	HI766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
	HI766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
	HI766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
Accessories	HI710007	blue shockproof rubber boot
	HI710008	orange shockproof rubber boot

*K-type thermocouple probes should be ordered separately to meet your specific application.

HI935003

K-Type Thermocouple Thermometer

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

HI935003 is designed for the measurement of industrial and domestic applications as well as farm and field temperatures.

This thermometer is compatible with K-type thermocouple probes to provide the greatest accuracy and offers a large range of temperature measurement; from -50 to 300°C (-58.0 to 572°F).

Features include waterproof casing (rated IP65), CAL Check, low battery detection, auto-off capability, and long battery life.



Our optional HI710027 blue shockproof rubber boot offers maximum impact protection.

Specifications	HI935003
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy (@ 23.0°C ±5°C)	±0.4 °C (-50.0 to 300 °C) ±0.7 °F (-58.0 to 572 °F)
Response time for 90% of final value	20 seconds
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	Rated operating condition: -20 to 50 °C (-4 to 122 °F)
	limiting condition: -30 to 50°C (-22 to 122°F)
	storage and transportation condition: -40 to 70°C (-40 to 158°F)
relative humidity 100 %	
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	178 g (6.27 oz.)
Ordering Information	HI935003 is supplied with 1.5V AAA batteries (3), quality certificate, and instructions.
Probes	HI766C Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
	HI766D Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
	HI766E1 General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

* The measurement range applies to 11 °C (50 °F) and above.

General Specifications

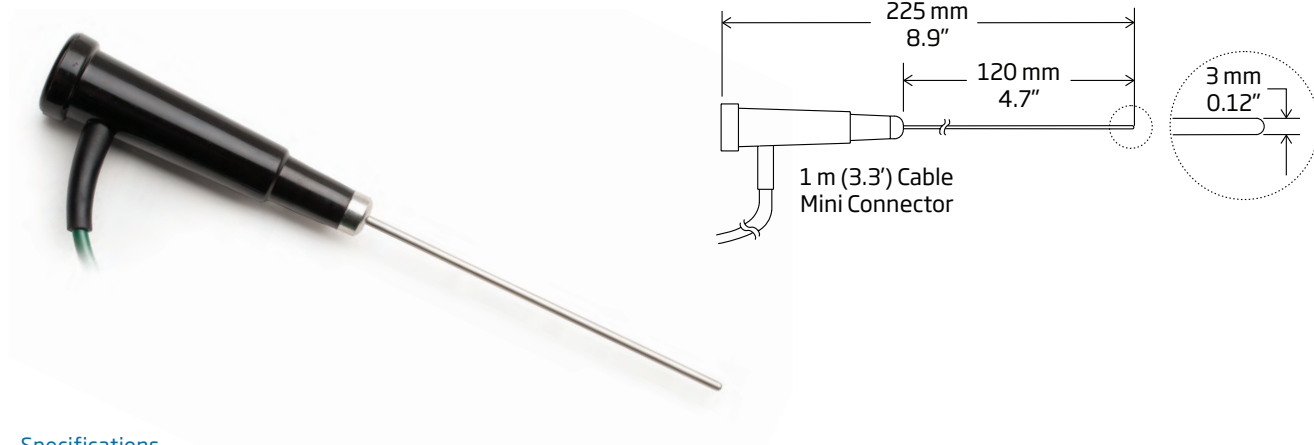
Accuracy

±1.5°C (up to 375°C)

±0.004 x T °C (above 375°C)

HI766E1

General Purpose Probe

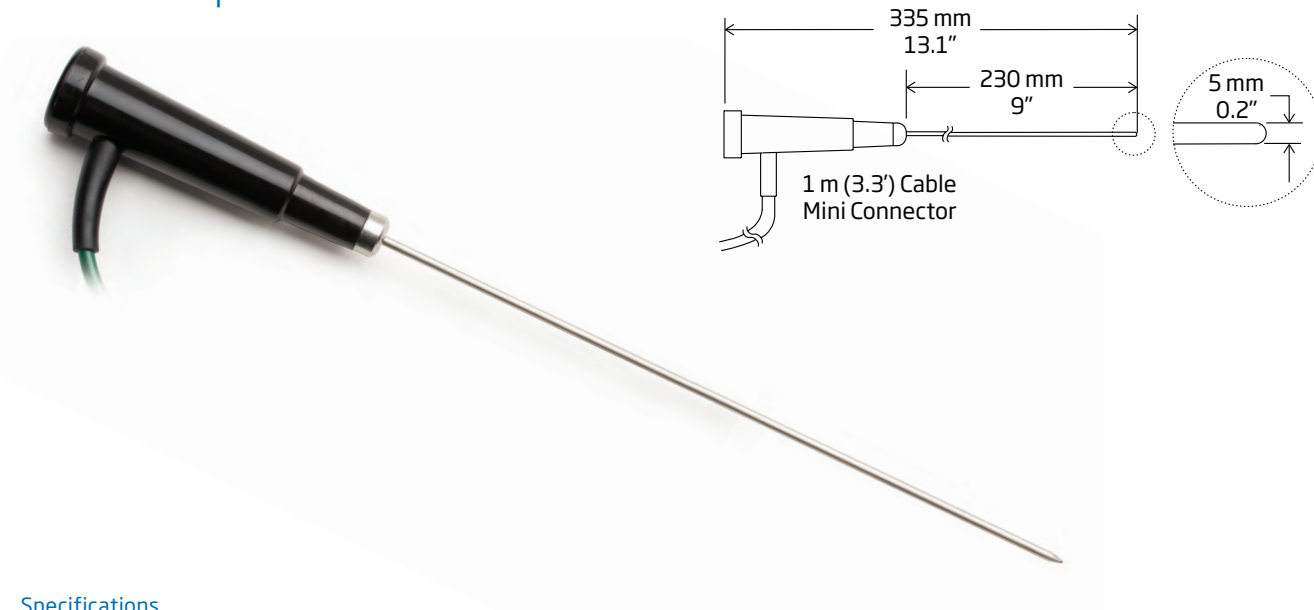


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
HI766E1	900°C (1650°F)	17 seconds	L 120 mm x dia 3 mm (4.7 x 0.12")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766E2

General Purpose Probe



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
HI766E2	900°C (1650°F)	35 seconds	L 230 mm x dia 5 mm (9.0 x 0.2")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766 K-Type Thermocouple Probes

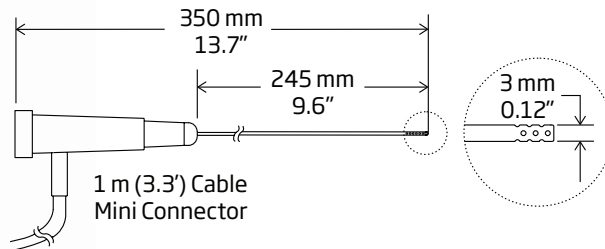
General Specifications

Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

HI766D

Air and Gas Probe

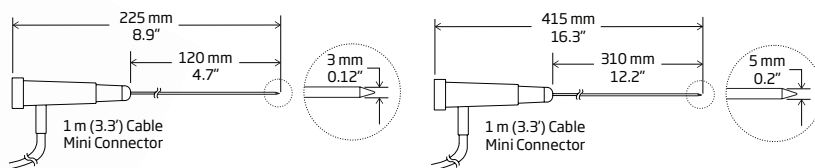
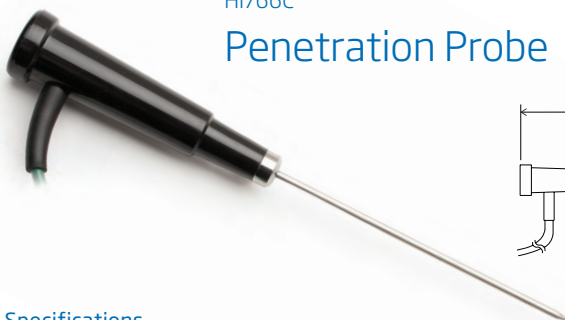


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766D	300°C (570°F)	5 seconds	L 245 mm x dia 3 mm (9.6 x 0.12")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766C

Penetration Probe

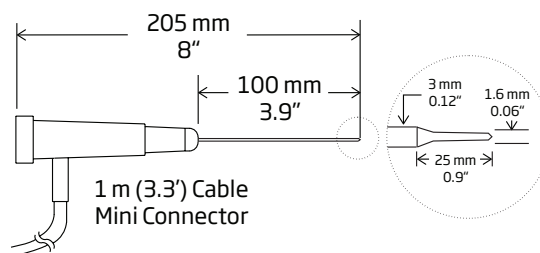


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766C	900°C (1650°F)	15 seconds	L 120 mm x dia 3 mm (4.7 x 0.12")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type
HI766CL	900°C (1650°F)	10 seconds	L 310 mm x dia 5 mm (12.2 x 0.2")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766C1

Ultra-Fast Penetration Probe



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766C1	300°C (570°F)	3 seconds	L 100 mm x dia 1.6 mm (3.9 x 0.06")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

General Specifications

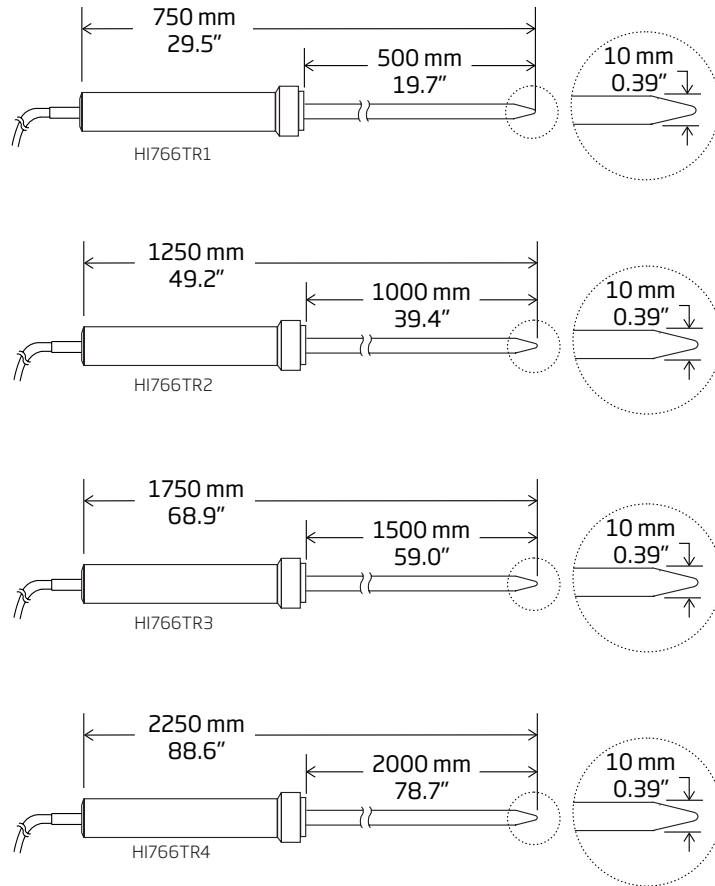
Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

HI766 K-Type Thermocouple Probes

HI766TR1, HI766TR2, HI766TR3, HI766TR4

Penetration Probes for Semi-Solid Samples



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766TR1	250°C (482°F)	14 seconds	L 500 mm x dia 10 mm (19.7 x 0.39")	stainless steel	PVC	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type
HI766TR2	250°C (482°F)	14 seconds	L 1000 mm x dia 10 mm (3.3' x 0.39")	stainless steel	PVC	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type
HI766TR3	250°C (482°F)	14 seconds	L 1500 mm x dia 10 mm (5' x 0.39")	stainless steel	PVC	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type
HI766TR4	250°C (482°F)	14 seconds	L 2000 mm x dia 10 mm (6.6' x 0.39")	stainless steel	PVC	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766

HI766 K-Type Thermocouple Surface Probes

The following probes are designed to ensure optimal contact with surfaces of different shapes and dimensions. When using these probes, the handle temperature must never exceed 150°C (302°F) to avoid possible damage to the probe.

General Specifications

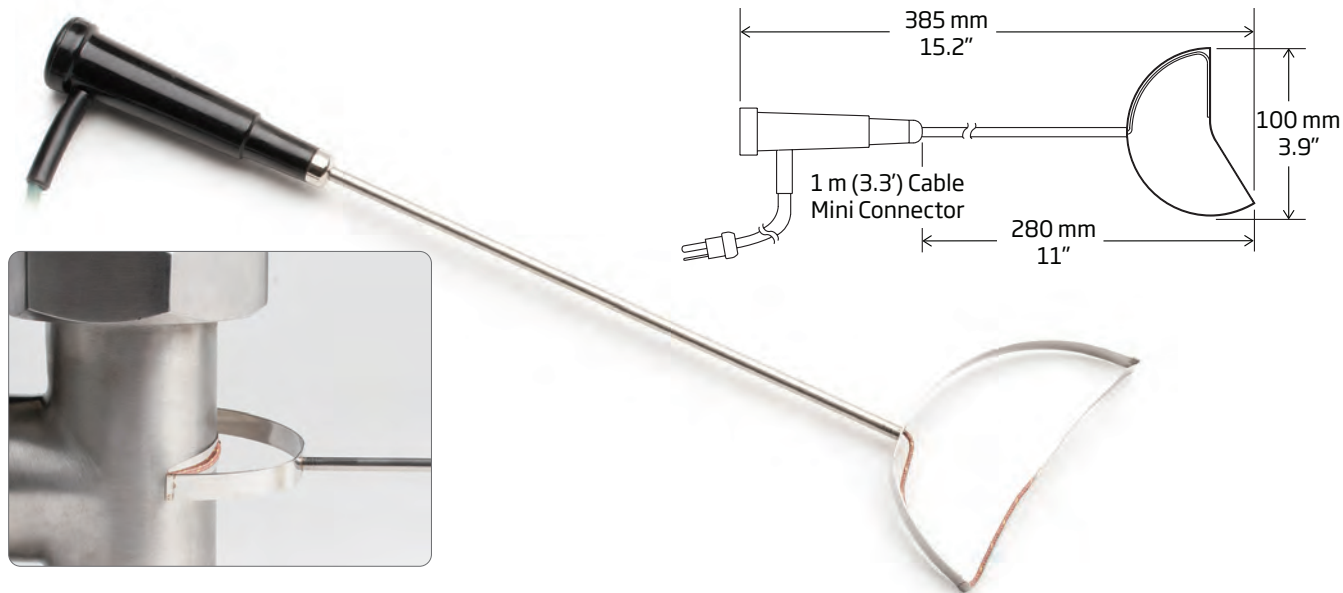
Accuracy

±1.5°C (up to 375°C)

±0.004 x T °C (above 375°C)

HI766A

Roller Surface Probe for Convex Surfaces

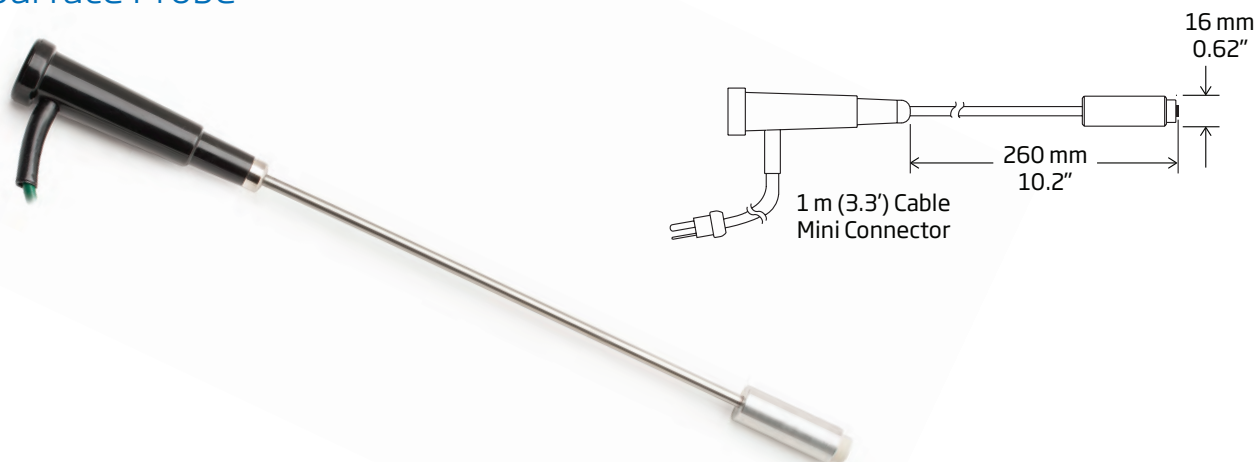


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766A	320°C (600°F)	4 seconds	L 280 mm x 100 mm (11 x 3.9") (probe length)	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766B

Surface Probe



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766B	650°C (1200°F)	8 seconds	L 260 mm x dia 16 mm (10.2 x 0.6")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

General Specifications

Accuracy

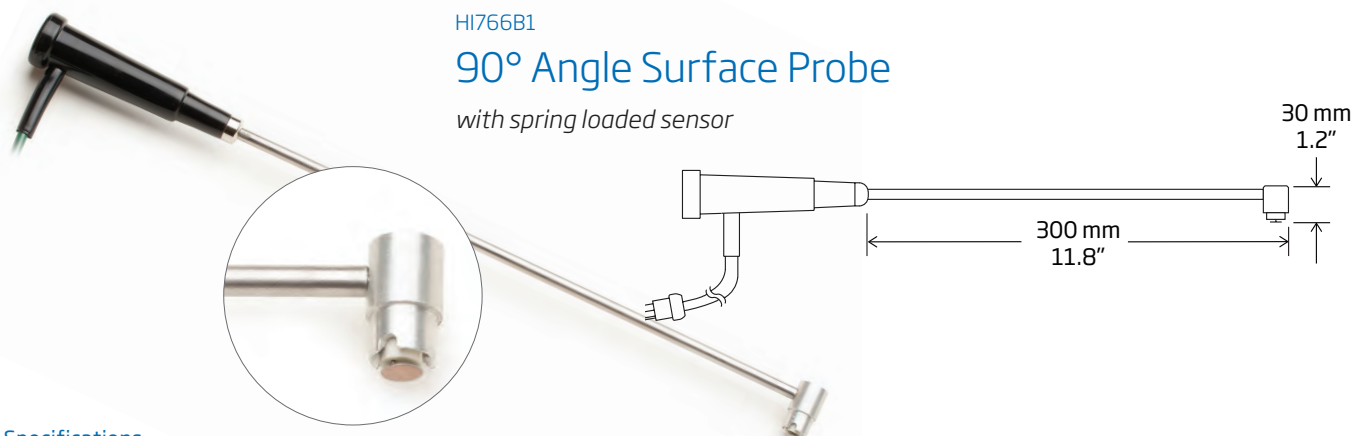
 $\pm 1.5^{\circ}\text{C}$ (up to 375°C) $\pm 0.004 \times T^{\circ}\text{C}$ (above 375°C)

HI766 K-Type Thermocouple Surface Probes

HI766B1

90° Angle Surface Probe

with spring loaded sensor



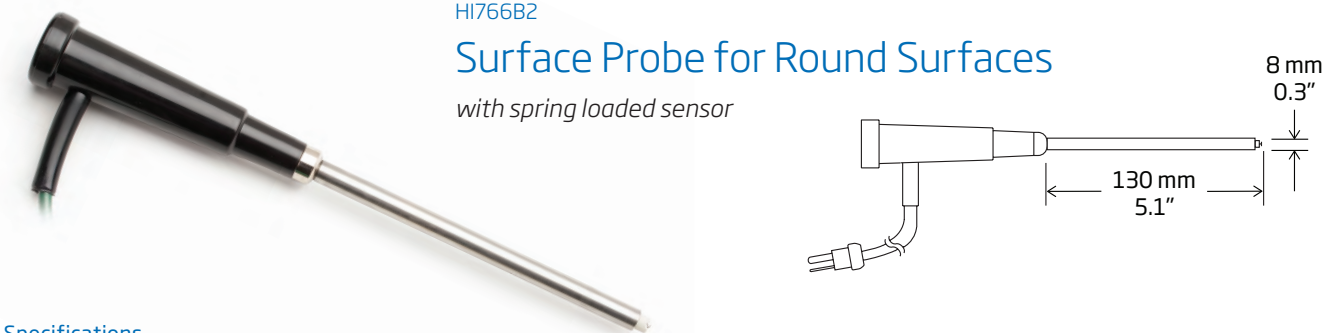
Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
HI766B1	450°C (840°F)	8 seconds	L 300 mm x dia 30 mm (11.8 x 1.2")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766B2

Surface Probe for Round Surfaces

with spring loaded sensor



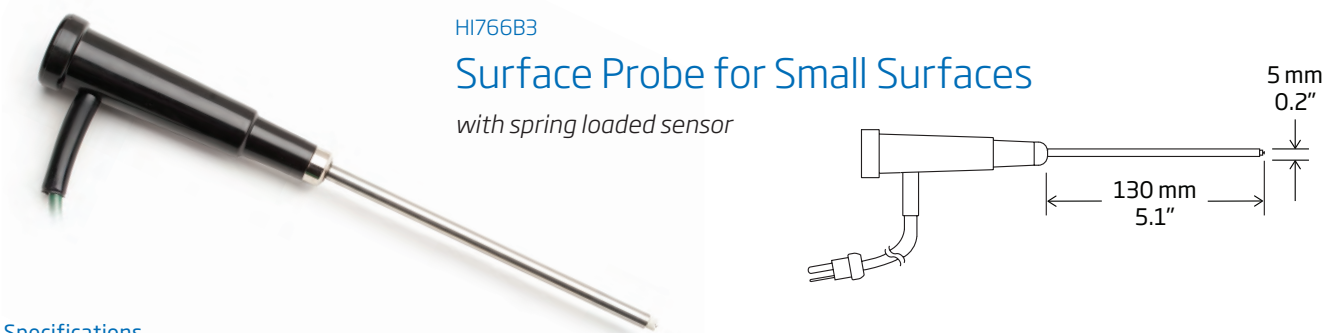
Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
HI766B2	900°C (1650°F)	5 seconds	L 130 mm x dia 8 mm (5.1 x 0.3")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766B3

Surface Probe for Small Surfaces

with spring loaded sensor



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
HI766B3	200°C (390°F)	6 seconds	L 130 mm x dia 8 mm (5.1 x 0.3")	stainless steel	Polypropylene (PP)	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI766

HI766 K-Type Thermocouple Probes without Handle

General Specifications

Accuracy

±1.5°C (up to 375°C)

±0.004 x T °C (above 375°C)

The HI766P series are K-type thermocouple temperature probes to be used with thermocouple thermometers. These probes are ideal for measuring samples at very high temperatures, such as in industrial applications. Probes in this section are recommended to be used with the HI766HD probe handle and/or HI766EX extension cable. All probes are made of stainless steel for long life and easy cleaning.



HI766HD
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 HI766P probe.

Specifications

Code	Probe Handle	Probe Handle Color	Cable Type	Cable Color / Length	Connector Type
HI766HD	Polypropylene (PP)	black	Polyurethane (PUR)/coiled	green / 1 m (3.3')	K-Type



HI766EX
Extension Cable

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

Specifications

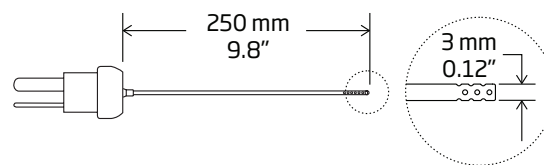
Code	Cable Type	Cable Color / Length	Connector Type
HI766EX	Polyurethane (PUR)/coiled	green / 1 m (3.3')	K-Type



HI766PD
Air and Gas Probe

Specifications

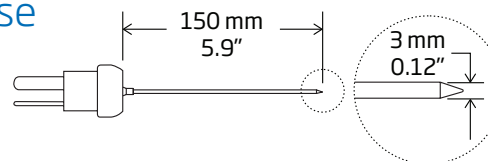
Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PD	300°C (570°F)	5 seconds	L 250 mm x dia 3 mm (9.8 x 0.12")	stainless steel	K-Type



HI766PC
Penetration Probe, General Purpose

Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PC	900°C (1650°F)	15 seconds	L 150 mm x dia 3 mm (5.9 x 0.12")	stainless steel	K-Type



General Specifications

Accuracy

±1.5°C (up to 375°C)

±0.004 x T °C (above 375°C)

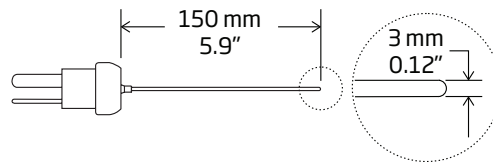
HI766 K-Type Thermocouple Probes without Handle

Temperature

thermocouple probes

HI766PE1

General Purpose Probe

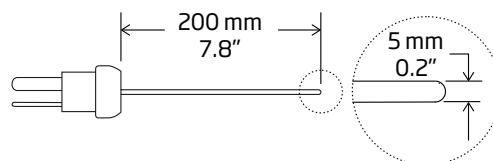


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PE1	900°C (1650°F)	16 seconds	L 150 mm x dia 3 mm (5.9 x 0.12")	stainless steel	K-Type

HI766PE2

General Purpose Probe

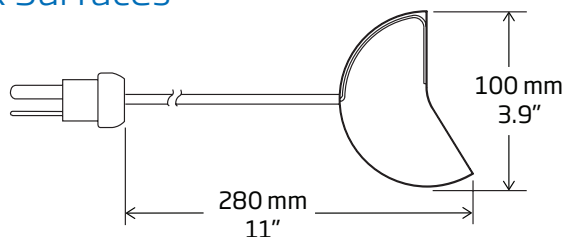


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PE2	900°C (1650°F)	35 seconds	L 200 mm x dia 5 mm (7.8 x 0.2")	stainless steel	K-Type

HI766PA

Roller Surface Probe for Convex Surfaces

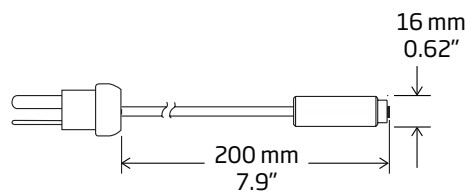


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PA	320°C (600°F)	5 seconds	L 280 mm x 100 mm (11 x 3.9")	stainless steel	K-Type

HI766PB

Surface Probe



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Connector Type
HI766PB	650°C (1200°F)	4 seconds	L 200 mm x dia 16 mm (7.9 x 0.6")	stainless steel	K-Type

HI766

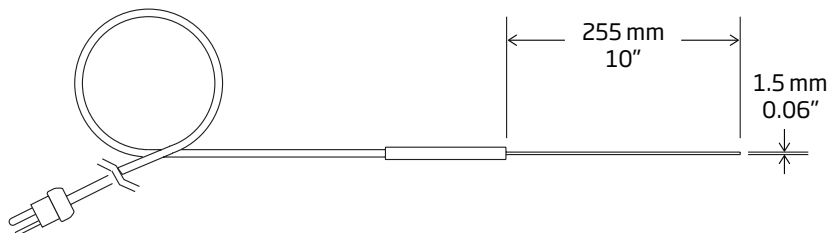
HI766 K-Type Thermocouple Wire Probes

General Specifications	
Accuracy	±1.5°C (up to 375°C) ±0.004 x T °C (above 375°C)

HI766F

High Temperature Wire Probe

with flexible sheath

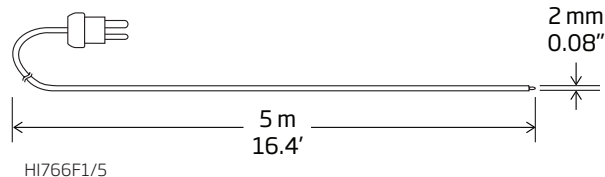
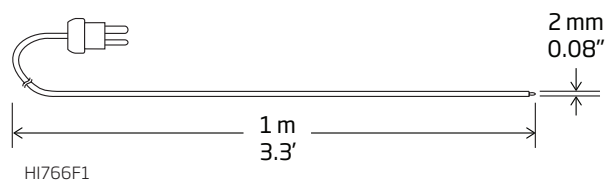


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Cable Type	Cable Length	Connector Type
HI766F	1100°C (2000°F)	3 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	AISI 316 stainless steel	Aluminum	fiberglass with stainless steel overbraid / straight	1 m (3.3')	K-Type

HI766F1

Wire Probe for Hard to Reach Places



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Sensor	Cable Type	Cable Length	Connector Type
HI766F1	480°C (900°F)	4 seconds	dia 2 mm (0.08")	exposed wire	fiberglass/straight	1 m (3.3')	K-Type
HI766F1/5	480°C (900°F)	4 seconds	dia 2 mm (0.08")	exposed wire	fiberglass/straight	5 m (16.4')	K-Type

General Specifications

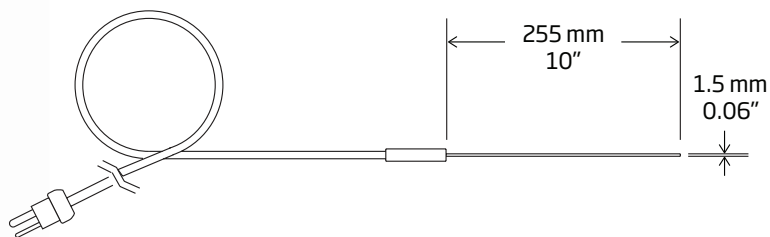
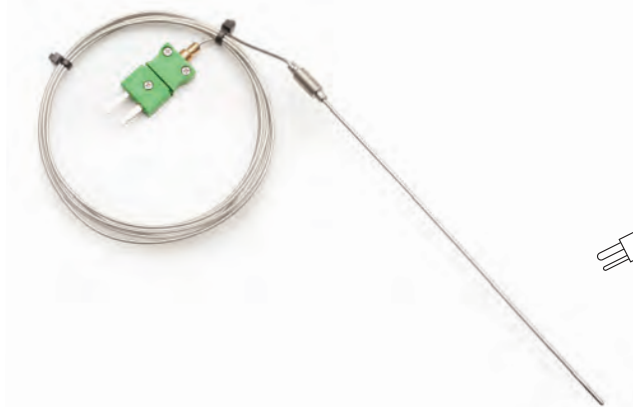
Accuracy

 $\pm 1.5^{\circ}\text{C}$ (up to 375°C) $\pm 0.004 \times T^{\circ}\text{C}$ (above 375°C)

HI766 K-Type Thermocouple Wire and Clamp Probes

HI766Z

Wire Probe for Ovens

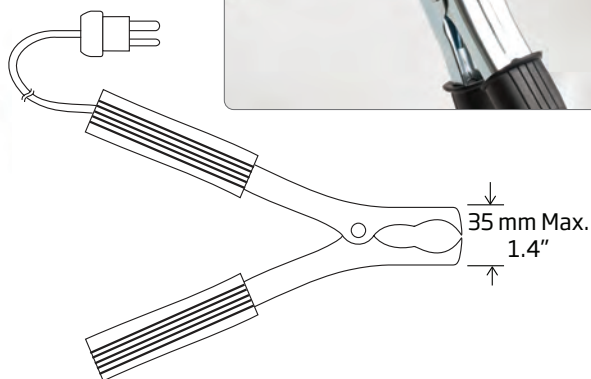


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Cable Type	Cable Length	Connector Type
HI766Z	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	stainless steel/straight	1.7 m (5.6')	K-Type
HI766Z/3	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	stainless steel/straight	3 m (9.9')	K-Type
HI766Z/7	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	stainless steel/straight	7 m (22.9')	K-Type

HI766TV1

Clamp Probe for Pipes and Tubes



Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	sensor	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI766TV1	200°C (390°F)	4 seconds	Clamp Opening Diameter max 35 mm (1.4")	housed inside the clamp	ABS	Black	Polyurethane (PUR)/coiled	green / 1 m (3.3') cable	K-Type

HI93510 · HI93510N

Thermistor Thermometers

- **HOLD**
 - HOLD Feature
- **BEPS**
 - Alerts the user of low battery power that could adversely affect readings
- **Battery indicator**
 - Battery level indicator at startup
- **Backlight**
 - Backlit display (N version)
- **Waterproof**
 - Compact, heavy-duty and waterproof

The HI93510 is a waterproof thermometer tailored for the lab and field. The LCD displays the highest and lowest readings in the cycle along with the current temperature. To freeze the reading for easy recording, simply press the HOLD button. Celsius or Fahrenheit range can be selected at the touch of a button.

The HI93510N offers all the features of the HI93510 plus a CAL button to allow the operator to calibrate the meter and probe in an ice bath at 0°C. This will assure the removal of the combined meter and probe interchange error. In addition to calibration capabilities, HI93510N has a user-activated backlit display.

A diverse assortment of HI762 probes and cable lengths are available. Probes can be ordered with different handle colors to prevent cross-contamination.

Advanced battery management features include a display of remaining battery power at startup, low battery warning and BEPS (Battery Error Prevention System), which alerts the user in the event that low battery power could adversely affect readings.



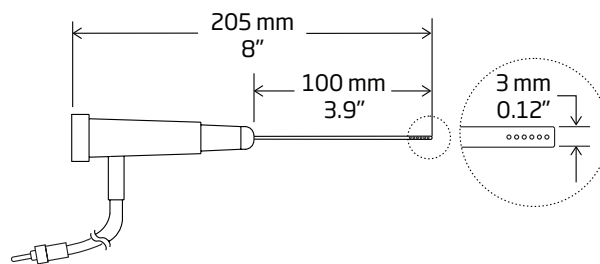
Specifications	HI93510	HI93510N
Range	-50.0 to 150.0°C; -58.0 to 302.0°F	
Resolution	0.1°C; 0.1°F (-58.0 to 230.0°F) and 0.2°F (outside)	
Accuracy	±0.4°C; ±0.8°F (for 1 year, excluding probe error)	
Probe	HI762BL air/liquid, stainless steel thermistor temperature probe with black handle and 1 m (3.3') cable (included)	
CAL Button	N/A	yes
Backlit LCD	N/A	yes
Battery Type / Life	1.5V AA (3) / approximately 2000 hours of continuous use (with backlight off); HI93510 only: auto-off selectable after 8 or 60 minutes of non-use (can be disabled)	
Environment	-10 to 50°C (14 to 122°F); RH max 100%	
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")	
Weight	235 g (8.3 oz.)	
Ordering Information	HI93510 and HI93510N are supplied with HI762BL temperature probe, batteries and instructions.	
Probes	HI762L	Liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
	HI762A	Air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
Accessories	HI710007	blue shockproof rubber boot
	HI710008	orange shockproof rubber boot

General Specifications

Sensor	Range	Accuracy	Interchange Error	Connector Type
NTC Thermistor	-50 to 150°C (-58 to 302°F)	±0.2°C (±0.4°F)	±0.2°C (±0.4°F)	RCA

HI762A

Air and Gas Probe

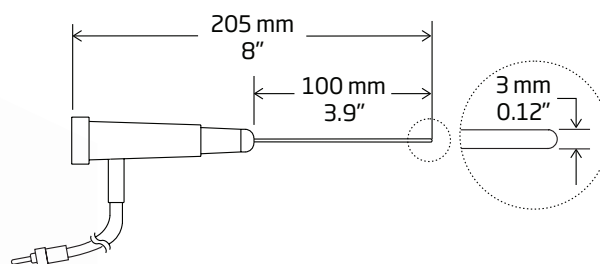


Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length
HI762A	5 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	white /1 m (3.3') Cable

HI762L, HI762BL

Liquid Probe, General Purpose



Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length
HI762L	5 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	white /1 m (3.3') Cable
HI762L/2	5 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	2 m (6.6') Cable
HI762L/10	5 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	black /10 m (32.8') Cable
HI762BL	6 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	black	PVC/straight	1 m (3.3') Cable

Calibration Test Keys for Thermistor Thermometers

For measurements that are always reliable, thermometers must be calibrated periodically. Hanna test keys offer a fast and simple way of checking the accuracy of your instruments. Connect the key to the probe input. If the reading on the display differs more than 0.4°C (0.8°F) from the key rated value, your thermometer should be recalibrated at our technical service center.



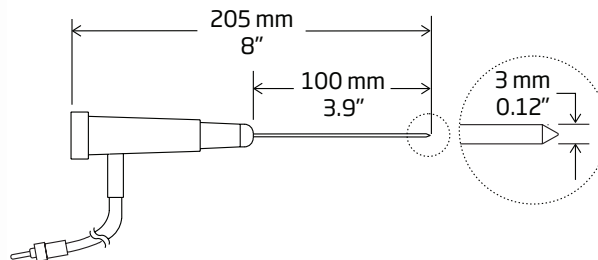
Test Keys for Thermometers Using HI762 Probes

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

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

HI762PW, HI762PBL

Penetration Probe, General Purpose

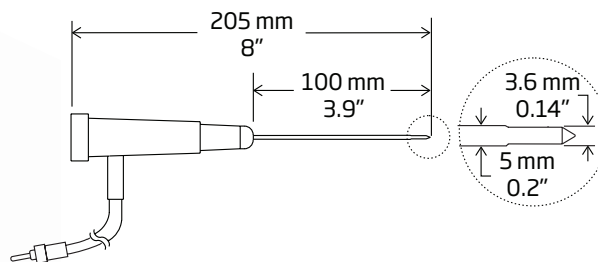


Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Length
HI762PBL	14 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	blue	PVC/straight	1 m (3.3') Cable
HI762PW	6 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	1 m (3.3') Cable

HI762PWL

Sharp tip Probe for Penetration of Semi-solid Samples.



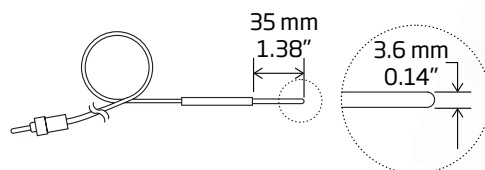
Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Length
HI762PWL	10 seconds	L 100 mm x dia 3.6 mm (3.9 x 0.15")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	1 m (3.3') Cable

HI762W

Wire Probe for Hard to Reach Places

Probe does not incorporate a handle.



HI762W/10

Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length
HI762W	7 seconds	L 35mm x dia 3.6mm (1.38" x 0.14")	AISI 316 stainless steel	-	-	PVC/straight	1 m (3.3') Cable
HI762W/10	7 seconds	L 35mm x dia 3.6mm (1.38" x 0.14")	AISI 316 stainless steel	-	-	PVC/straight	black /10 m (32.8') Cable

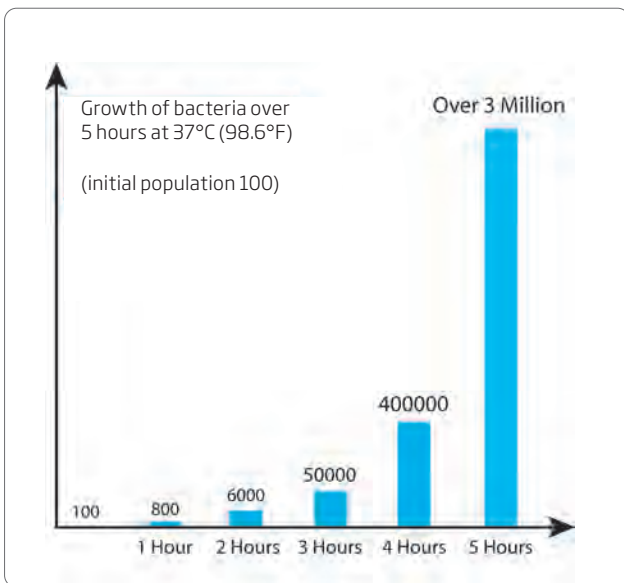
Hanna Thermometers for the Food Sector

Operators in the food sector need an extensive range of products in order to guarantee the quality and safety of food supplied to the public while maintaining compliance with local and federal laws. In order to satisfy the need for quality, safety, and compliance, Hanna manufactures a vast range of products with the necessary accuracy and reliability to check the quality of food in all phases of preparation and distribution.

Many of Hanna's portable and pocket thermometer lines have become synonymous with temperature control in restaurants and catering facilities.

For the adverse measurement conditions found in food production areas, typically with high humidity and condensation problems, Hanna has manufactured a substantial array of waterproof meters.

To satisfy the requirements of HACCP, Hanna supplies a complete range of thermometers and pH meters to check goods from production to transport and from catering to storage. Documentation is a must in certain production cycles and important for HACCP programs. For this Hanna offers a range of logging meters. These are stand-alone meters that can measure and log the parameters without any supervision. Shock-resistant protective boots are available for many of our instruments.



Temperature

Temperature of food is constantly monitored to keep growth of pathogens and microorganisms under control. Temperature is important in production to ensure that the food is not spoiled and the quality is not compromised, therefore enhancing its value. Food needs to be kept at the correct temperature while stored, displayed, and on the move. If temperature is not properly controlled, bacteria can grow to dangerous levels in just a few hours.

The table below lists recommended temperatures for different products. It is vital to monitor and document the temperature to which food has been exposed.

Product	Temp.	Product	Temp.
Chunks of Meat	≤ 7°C	Smoked Fish	≤ 7°C
Minced Meat	≤ 4°C	Frozen Food	≤ -18°C
Innards	≤ 3°C	Milk	≤ 7°C
Frozen Chicken	≤ -12°C	Fruit and Vegetables	≤ 10°C
Deep-freeze Chicken	≤ -18°C	Eggs	≤ 8°C
Fresh Fish	≤ 2°C	Dried Fruit	≤ 25°C

Products and their recommended storage temperatures



Temperature plays an important role in the processing and preparation of edible products containing meat

Meat

The temperature of meat at slaughterhouses is a vital quality control test and needs to be checked at various points of production. Fresh meat should be stored at about 2°C (35.6°F).

For deep-freeze meat in storage, it should have an internal temperature around -22°C (-7.6°F) with the surface temperature reaching -35°C (-31°F). In order to thaw the meat properly, the surrounding temperature should be 7°C (44.6°F).

Ham and Sausages

The temperature of salted meat stored for several months is around 2°C (35.6°F). Afterwards, the product is rinsed and dried at around 25°C (77°F) prior to maturing at a preset temperature for a particular product. For sausages, the mixed ingredients are cooked at a certain temperature and then cooled at around 5 to 15°C (41 to 59°F).



Beverages

The temperature of spring or deep well waters that are extracted for beverage production must be continuously monitored to ensure purity. During the production of soft drinks, syrup is pasteurized before being added, to prevent bacteriological problems. In order to prepare fruit juices, fruit pulp is heated to just below boiling point for a few seconds to reduce the presence of microorganisms. During both of these processes, accurate temperature monitoring is crucial.

Temperature control also plays a crucial role in beer production. For example, malt has to be heated to 75°C (167°F) during the mash process. Once the mash is cooled, the vessel is heated above boiling point to prepare the mash for a strainer; later the mash is heated to up to 120°C (248°F) for a few seconds to pasteurize it. The type of yeast then used for the fermentation process is also temperature dependent. By controlling the fermentation temperature, operators can determine the time needed for the product to fully develop. Temperature is also controlled during filtration, which is needed in order to remove particles and improve the taste and longevity of beer. In order to remove protein, beer is cooled down to almost 0°C (32°F). As with many other products on the market, beer is pasteurized at around 60°C (140°F) after it has been bottled to eliminate the presence of microorganisms.

Milk and Dairy Products

Milk is checked for impurities and bacteria upon collection. During storage, the temperature of milk is normally kept below 5°C (41°F). In order to slow down cream formation, milk is homogenized at about 60°C (140°F).

The pasteurization of milk results in the reduction of microorganisms by 95% and is attained by raising the temperature to over 72°C (161.6°F). For UHT (ultra heat treated), milk is heated to 135/150°C (275/302°F) in a pressurized vessel for a few seconds. If the process is repeated for several minutes, all microorganisms, including spores, are destroyed and the sterilized milk will have a 12 month shelf life. For cheese, temperature needs to be adjusted before and during various processes, for example, when rennet is added.

Temperature in the maturation chamber also determines the period of maturation needed. Likewise, temperature is important in the production of butter. For example, skimmed milk is separated from cream at around 55°C (131°F) and the cream is then cooled to about 8°C (46.4°F). The temperature of incoming milk is raised to 45°C (113°F) before the addition of a culture for yogurt manufacturing. In order to denature the whey proteins, milk is raised to very high temperatures. The incubation temperature is maintained for a few hours prior to its cooling to about 10°C (50°F).





Chocolate

Fermentation of cocoa beans is started by increasing the temperature to about 50°C (122°F). At different stages of chocolate manufacturing such as crystallization, accurate temperature measurement is a must. Once the chocolate is ready, the storage temperature should be monitored to ensure that it stays in the 15°C (59°F) range.



Bread and Pasta

The temperature of stored grain in silos is controlled to ensure that premature fermentation does not occur. During pasta production, water at about 25°C (77°F) is added to wheat flour during fermentation of dough for bread-making, the temperature is kept at around 30°C (86°F). The oven temperature for baking should be around 260°C (500°F) and once baked, bread is cooled to room temperature. For semi-finished products that can be flash-baked, the dough has to be stored at very low temperatures.



Sanitization of Machinery

The temperature of cleansing agents, together with their concentration, have a significant bearing on how effectively the machinery is sanitized. The temperature for fermentation vessels can range from room temperature to 40°C (104°F). For milk and yogurt, tanks may reach 70°C (158°F) and as high as 150°C (302°F) for steam sterilizers. In addition, regulatory bodies recommend a certain minimum temperature for cleaning agents to be effective; this can vary from 24°C (75.2°F) for iodine and ammonia and 49°C (120.2°F) for chlorine.



Coffee

In order to invoke an aroma, coffee beans are heated up to 200°C (392°F). During roasting, the temperature is closely monitored. In order to provide a long shelf life, the finished product is frozen at -40°C (-40°F) prior to drying. To produce a good coffee, it is important to ensure that the temperature of coffee machines does not exceed 80°C (176°F).

HI935012

Brewing Thermometer

with 1 m stainless steel probe

- FC762N2 1 m (3.3') stainless steel thermistor probe
- Durable IP67 waterproof casing
 - Designed to withstand the knocks, drops, and spills of real life, the new IP67 body ensures top performance in any environment. These meters are totally protected against dust and water intrusion from any direction.
- Probe Error Messages
 - The "NO PROBE" message is displayed on the meter when a probe is not attached or there is a break in the cable.
- CAL Check™
 - The calibration check (CAL Check) feature of the HI935012 is an internal diagnostic feature that checks for any drift in the electronics that occurs with all digital thermometers over time. When the meter is turned CAL Check looks to see if the internal calibration is within +/- 0.3 oC. If the drift is greater and error (err) message will be displayed. With CAL Check you can be confident that the meter is working properly.
- Large LCD
 - An enhanced LCD displays the measurement reading in oC or oF, stability indicator, error messages, and low battery indicator.
- Stability Indicator
 - An hourglass indicator is displayed on the LCD until a stable reading is obtained. Once a reading stabilizes, the indicator disappears and a reading can be recorded.
- Long Battery Life:
 - The thermometer has an exceptional battery life of approximately 4500 hours using three common AAA batteries. The battery percent level is displayed when powered on alerting the user to the remaining battery life.
- Automatic Shut-off
 - The meter can be set to automatically turn off after 8 minutes or 60 minutes to conserve battery life in the event that the meter is left on. The auto-off feature can also be disabled.

HI935012 includes HI710026 blue shockproof rubber boot to offer maximum impact protection.



The HI935012 is a waterproof portable thermistor thermometer made for the brewing professional that needs to measure the temperature in the center of a tank or vessel. This meter can be used at other critical points of the brewing process including the wort boil and fermentation. The HI935012 is supplied with the FC762N2 thermistor probe that is made of stainless steel and is 1 meter long. For a fast and accurate measurement the pre-calibrated semi-conductor sensor is located in the tip of the probe.

The HI935012, as a meter, can measure over a wide range of temperatures from -50.0 oC (-58.0 oF) up to 150 oC (302 oF) and offers a very high accuracy of +/-0.1 oC (+/-0.2 oF). The accuracy of the meter is assured with advanced diagnostic features including CAL-Check that checks for an abnormal drift of the internal electronics. Using a properly prepared ice bath, the meter and probe can be calibrated by the user. Additional features to have confidence in the measurements include a battery error prevention system (BEPS) that will not allow a reading to be taken when there is not sufficient battery power and probe diagnostics that alert the user when the probe is not connected.

Supplied with Instrument Quality Certificate- HI935012 with the FC762N2 are calibrated according to an ISO9001 calibration system using standards and reference instruments in which the accuracy is traceable the National Institute of Standards (NIST) in the USA, or to internationally acceptable physical standards.

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



1 M stainless steel probe

The supplied FC762N2 thermistor probe that is 1 M (39") long and 10 mm (0.39") in diameter. This extra long probe allows for the measurement of temperature in the middle of tank to make sure it is consistent throughout.



Supplied with carrying case

The HI935102 is supplied with a soft carrying case that holds both the probe and the meter. There is a pouch inside for easy access to the meter.



Interchangeable with FC762 series thermistor probes



Specifications	HI935012
Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
Resolution	0.1°C; 0.1°F
Meter Accuracy @ 23.0°C ±5°C	±0.1°C (-20.0 to 120.0°C); ±0.2°F (-4.0 to 248.0°F)
Probe Accuracy (FC762N2)	±0.3°C (-10.0 to 80.0°C); ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F remaining range
Probe	FC762N2 1 m (3.3') penetration probe with 1 m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 4500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	for product internal measurement: rated operating condition: -20 to 50°C (-4 to 122°F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70°C (-40 to 158°F) relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	175 g (6.17 oz.)
Ordering Information	HI935012 is supplied with FC762N2 temperature probe, protective rubber boot, 1.5V AAA batteries (3), quick reference guide, and instructions in a soft carrying case.

HI93501

Thermistor Thermometer

- EN 13485 compliant
- FC762PW thermistor probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casing

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

HI93501 is a thermistor style thermometer that includes a stainless steel replaceable style penetration probe (FC762PW). It measures temperatures from -50 to 150°C (-58 to 302.0°F).

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



Our optional HI710026 blue shockproof rubber boot offers maximum impact protection.



Interchangeable with FC762 series thermistor probes

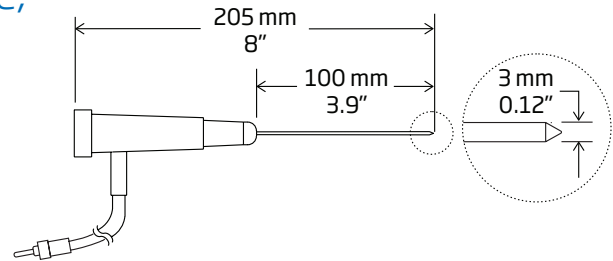
Specifications	HI93501
Range*	-50.0 to 150.0°C; -58.0 to 302.0°F
Resolution	0.1°C; 0.1°F
Meter Accuracy @ 23.0°C ±5°C	±0.1°C (-50.0 to 150.0°C); ±0.2°F (-58.0 to 302.0°F)
Probe Accuracy (FC762PW)	±0.3°C (-10.0 to 80.0°C); ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F remaining range
Response time for 90% of final value	10 seconds
Probe	FC762PW general purpose penetration probe with 1 m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 4500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	for air measurement: Type E for product internal measurement: rated operating condition: -20 to 50°C (-4 to 122°F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70°C (-40 to 158°F) relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	175 g (6.17 oz.)
Certification	EN 13485:2001 suitability: storage and transport; climatic environment: E; accuracy class: 1;
Ordering Information	HI93501 is supplied with FC762PW temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

FC762 Foodcare Thermistor Probes

General Specifications				
Sensor	Range	Accuracy	Interchange Error	Connector Type
NTC Thermistor	-50 to 150°C (-58 to 302°F)	±0.3°C (-10 to 80°C)/ ±0.5°F (14 to 176°F); ±0.7°C / ±1.3°F (outside)	±0.2°C (±0.4°F)	RCA

FC762PW

Foodcare Penetration Probe, General Purpose

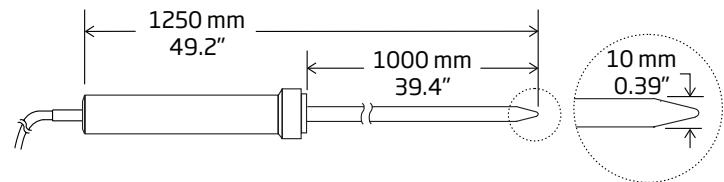


Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Length
FC762PW	6 seconds	L 100 mm x dia 3 mm (3.9 x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	PVC/straight	white / 2 m (6.6') Cable

FC762N2

Foodcare Probe for Tanks, Vessels, and Vats



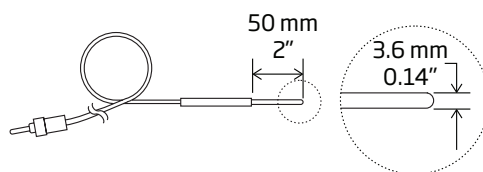
Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length
FC762N2		L 1000 mm x 10 mm (39" x 0.39")	Stainless steel	PVDF	white	PVC/straight	white / 2 m (6.6')

FC762W1/2

Wire probe designed for liquid immersion

Probe does not incorporate a handle.



Specifications

Code	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length
FC762W1/2	2min 45sec (98%FS)	L 50 mm x dia 3.6 mm (2" x 0.14")	AISI 316 stainless steel	-	-	PVC/straight	white / 2 m (6.6')

Foodcare

HI935001

K-Type Thermocouple Thermometer

- FC766PW K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication/ low battery detection
- Auto-off
- IP65 Waterproof casing

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

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

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



Our optional HI710027 blue shockproof rubber boot offers maximum impact protection.



Interchangeable with FC766 series thermocouple probes



Specifications HI935001

Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC766PW)	±1.6°C (-50.0 to 300°C); ±2.9°F (-58.0 to 572°F)
Response time for 90% of final value	20 seconds
Probe	FC766PW penetration, K-type thermocouple probe with 1 m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	Rated operating condition: -20 to 50 °C (-4 to 122 °F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70 °C (-40 to 158°F) relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Weight	178 g (6.27 oz.)
Ordering Information	HI935001 is supplied with FC766PW temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions. HI935001-03 includes the above without probe.

Foodcare

HI935004

T-Type
Thermocouple
Thermometer

- EN 13485 compliant
- FC767PW T-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication / low battery detection
- Auto-off
- IP65 Waterproof casing

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

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

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



Interchangeable
with FC767 series
thermocouple probes

Specifications	HI935004
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C ±5°C	±0.4°C (-50.0 to 300°C); ±0.7°F (-58.0 to 572°F)
Probe Accuracy (FC767PW)	±0.6°C (-50 to 100.0°C); ±1.6°C (100.0 to 300°C); ±1.1°F (-58 to 212°F); ±2.9°F (212 to 572°F)
Response time for 90% of final value	20 seconds
Probe	FC767PW penetration, T-type thermocouple probe with 1 m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	for air measurement: Type E
	for product internal measurement: rated operating condition: -20 to 50°C (-4 to 122°F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70°C (-40 to 158°F)
	relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	178 g (6.27 oz.)
Certification	EN 13485:2001 suitability: storage and transport; climatic environment: E; accuracy class: 1;
Ordering Information	HI935004 is supplied with FC767PW temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.



Our optional
HI710027 blue
shockproof
rubber boot offers
maximum impact
protection.

HI9350011

K-Type Thermocouple Thermometer

with ultra-fast probe

- FC766C1 ultra-fast K-type thermocouple probe
- CAL Check™ feature
- Remaining battery life indication/ low battery detection
- Auto-off
- IP65 Waterproof casing

The HI9350011 is a waterproof portable K-Type thermocouple thermometer made for the food professional that is required to monitor temperature as part of a hazardous analysis of critical control points (HACCP) plan including in food service, production, packaging, transportation, restaurants or catering. The HI9350011, as a meter, can measure over a wide range of temperatures from -50.0°C (-58.0°F) up to 300°C (573°F) and offers a very high accuracy of $\pm 0.4^\circ\text{C}$ ($\pm 0.7^\circ\text{F}$). The accuracy of the meter is assured with advanced diagnostic features including CAL-Check that checks for abnormal drift of the internal electronics, battery error prevention system (BEPS) that will not allow a reading to be taken when there is not sufficient battery power and probe diagnostics that alert the user when the probe is not connected or has been damaged.

HI9350011 Foodcare thermometer is supplied with the replaceable FC766C1 Ultra-Fast K-Type thermocouple probe that will reach 90% of the final reading within 4 seconds. The tip of FC766C1 is just 1.6 mm (0.06") in diameter allowing for easy penetrations into solids and semi-solids. The AISI 316 stainless steel body is 95 mm (3.7") long and is safe for food contact in compliance with Regulation (EC) 1935/2004.



Our optional HI710027 blue shockproof rubber boot offers maximum impact protection.



Interchangeable with FC766 series thermocouple probes

Specifications HI9350011

Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C $\pm 5^\circ\text{C}$	$\pm 0.4^\circ\text{C}$ (-50.0 to 300°C); $\pm 0.7^\circ\text{F}$ (-58.0 to 572°F)
Probe Accuracy (FC766C1)	$\pm 1.6^\circ\text{C}$ (-50.0 to 300°C); $\pm 2.9^\circ\text{F}$ (-58.0 to 572°F)
Response time for 90% of final value	4 seconds
Probe	FC766C1 penetration, K-type thermocouple probe with 1m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	Rated operating condition: -20 to 50 °C (-4 to 122 °F)
	limiting condition: -30 to 50°C (-22 to 122°F)
	storage and transportation condition: -40 to 70 °C (-40 to 158°F)
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Weight	178 g (6.27 oz.)
Ordering Information	HI9350011 is supplied with FC766C1 temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

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

Foodcare

HI9350041

T-Type Thermocouple Thermometer

with ultra-fast probe

- FC767C1 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.
- Auto-off
- IP65 Waterproof casing

The HI9350041 is a waterproof portable T-Type thermocouple thermometer made for the food professional that is required to monitor temperature as part of a hazardous analysis of critical control points (HACCP) plan including in food service, production, packaging, transportation, restaurants or catering. The HI9350041, as a meter, can measure over a wide range of temperatures from -50.0°C (-58.0°F) up to 300°C (572°F) and offers a very high accuracy of $\pm 0.4^{\circ}\text{C}$ ($\pm 0.7^{\circ}\text{F}$). The accuracy of the meter is assured with advanced diagnostic features including CAL Check that checks for abnormal drift of the internal electronics, battery error prevention system (BEPS) that will not allow a reading to be taken when there is not sufficient battery power and probe diagnostics that alert the user when the probe is not connected or has been damaged.

HI9350041 Foodcare thermometer is supplied with the replaceable FC767C1 Ultra-Fast T-Type thermocouple probe that will reach 90% of the final reading within 4 seconds. The tip of FC767C1 is just 1.6 mm (0.06") in diameter allowing for easy penetrations into solids and semi-solids. The AISI 316 stainless steel body is 95 mm (3.7") long and is safe for food contact in compliance with Regulation (EC) 1935/2004.

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



Our optional HI710027 blue shockproof rubber boot offers maximum impact protection.



Interchangeable with FC767 series thermocouple probes



Specifications	HI9350041
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
Meter Accuracy @ 23.0°C $\pm 5^{\circ}\text{C}$	$\pm 0.4^{\circ}\text{C}$ (-50.0 to 300°C); $\pm 0.7^{\circ}\text{F}$ (-58.0 to 572°F)
Probe Accuracy (FC767C1)	$\pm 0.6^{\circ}\text{C}$ (-50 to 100.0°C); $\pm 1.6^{\circ}\text{C}$ (100.0 to 300°C); $\pm 1.1^{\circ}\text{F}$ (-58 to 212°F); $\pm 2.9^{\circ}\text{F}$ (212 to 572°F)
Response time for 90% of final value	4 seconds
Probe	FC767C1 penetration, T-type thermocouple probe with 1 m (3.3') white cable and white handle
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	for air measurement: Type E for product internal measurement: rated operating condition: -20 to 50°C (-4 to 122°F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70°C (-40 to 158°F) relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	178 g (6.27 oz.)
Ordering Information	HI9350041 is supplied with FC767C1 temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

HI935007

K-Type Thermocouple Thermometer

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

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

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

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



Fixed thermocouple probe



Our optional HI710026 blue shockproof rubber boot offers maximum impact protection.

Specifications	HI935007
Range*	-50.0 to 199.9°C / 200 to 300°C; -58.0 to 399.9°F / 400 to 572°F
Resolution	0.1°C (-50.0 to 199.9°C) / 1°C (200 to 300°C); 0.1°F (-58.0 to 399.9°F) / 1°F (400 to 572°F)
System Accuracy (Meter @ 23.0°C ±5°C)	±1°C (-50.0 to 100.0°C) / ±2 °C (100.0 to 300°C); ±1.8°F (-58.0 to 212°F) / ±3.6 °F (212 to 572°F)
Probe	fixed penetration, K-type thermocouple probe with 1 m (3.3') white cable and white handle
Response time for 90% of final value	20 seconds
Battery Type / Life	1.5V AAA (3) / approximately 3500 hours of continuous use; user-selectable auto-off after 8 or 60 minutes of non-use (can be disabled).
Environment	Rated operating condition: -20 to 50 °C (-4 to 122 °F) limiting condition: -30 to 50°C (-22 to 122°F) storage and transportation condition: -40 to 70°C (-40 to 158°F) relative humidity 100 %
Storage/transport temperature	-40 to 70°C (-40 to 158°F)
Dimensions	140 x 57 x 28 mm (5.5 x 2.2 x 1.1")
Mass	178 g (6.27 oz.)
Ordering Information	HI935007 is supplied with fixed temperature probe, 1.5V AAA batteries (3), quick reference guide, and instructions.

General Specifications

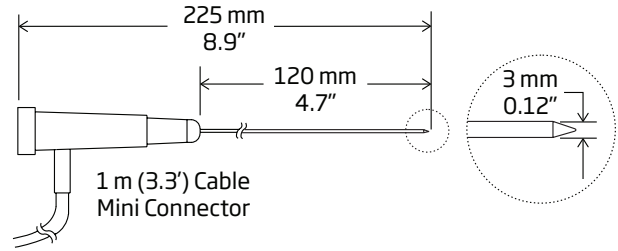
Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

FC766 Foodcare K-Type Thermocouple Probes

FC766PW

Foodcare Penetration Probe

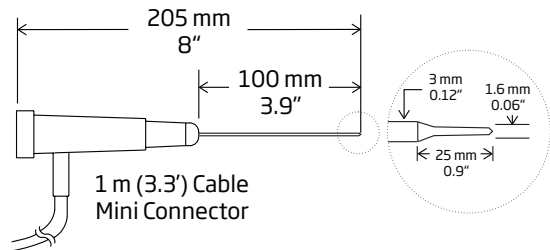


Specifications

Code	Max. Temperature	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
FC766PW	300°C (570°F)	13 seconds	L 120 mm x dia 3 mm (4.7 x 0.12")	stainless steel	Polypropylene (PP)	white	Polyurethane (PUR)/coiled	white / 1 m (3.3')	K-Type

FC766C1

Foodcare Ultra-fast Probe

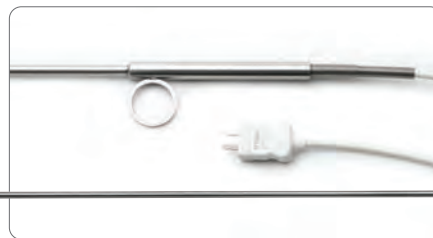


Specifications

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

FC766TS Series

Foodcare Penetration Probe for Semi-Solid Samples



Specifications

Code	Range	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/ Length	Connector Type
FC766TS2	-40 to 400°C (-40 to 752°F)	14 seconds	L 200 mm x dia 6 mm (.66' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	K-Type
FC766TS5	-40 to 400°C (-40 to 752°F)	14 seconds	L 500 mm x dia 6 mm (1.64' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	K-Type
FC766TS7	-40 to 400°C (-40 to 752°F)	14 seconds	L 700 mm x dia 6 mm (2.29' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	K-Type
FC766TS10	-40 to 400°C (-40 to 752°F)	14 seconds	L 1000 mm x dia 6 mm (3.28' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	K-Type
FC766TS14	-40 to 400°C (-40 to 752°F)	14 seconds	L 1400 mm x dia 6 mm (4.59' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	K-Type

FC766

FC766 Foodcare K-Type Thermocouple Probes without Handle

General Specifications

Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

The FC766P series are K-type thermocouple temperature probes to be used with thermocouple thermometers. These probes are ideal for measuring samples at very high temperatures, such as in industrial applications. Probes in this section are recommended to be used with the FC766HD probe handle and/or FC766EX extension cable. All probes are made of stainless steel for long life and easy cleaning.



FC766HD

FC766HD

Foodcare Probe Handle

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

Specifications

Code	Probe Handle	Probe Handle Color	Cable Type	Cable Color / Length	Connector Type
FC766HD	Polypropylene (PP)	white	Polyurethane (PUR)/coiled	white / 1 m (3.3')	K-Type



FC766EX

FC766EX

Foodcare Extension Cable

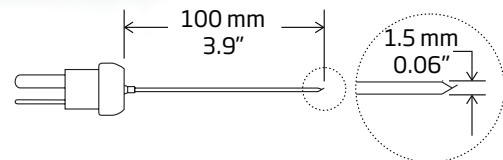
A coiled cable which extends the probe cable by 1 m (3.3') , with two connectors at the two ends (1 male and 1 female).

Specifications

Code	Cable Type	Cable Color / Length	Connector Type
FC766EX	Polyurethane (PUR)/coiled	white / 1 m (3.3')	K-Type

FC766PC1

Foodcare Stainless Steel Probe with Exposed Sensor



Specifications

Code	Range	Probe Dimensions	Probe Material	Sensor	Connector Type
FC766PC1	-40 to 300°C	L100mm x dia 1.5mm	stainless steel	exposed wires	K-Type

General Specifications

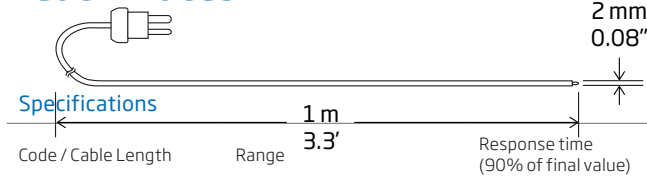
Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

FC766 Foodcare K-Type Thermocouple Probes for Specific Applications

FC766F

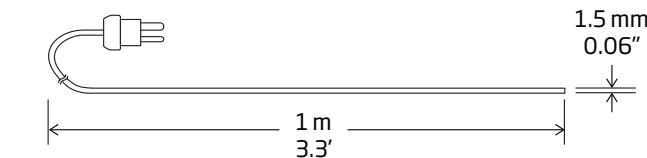
Foodcare Wire Probes for Hard to Reach Places



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

FC766Y

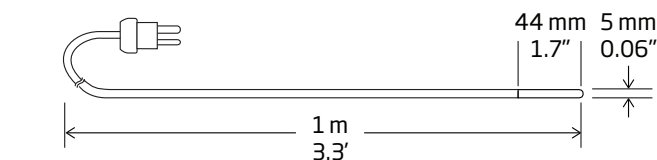
Foodcare Wire Probes for Ovens and Furnaces



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

FC766W1

Foodcare Wire Probes with Insulated Cable



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

FC766

FC766 Foodcare K-Type Thermocouple Probes for Specific Applications

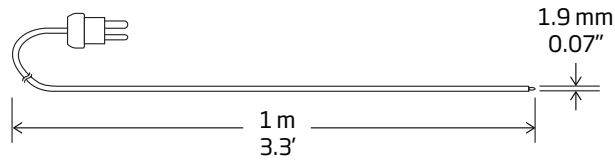
General Specifications

Accuracy

±1.5°C (up to 375°C)
±0.004 x T °C (above 375°C)

FC766T

Foodcare Wire Probes for Hard to Reach Places

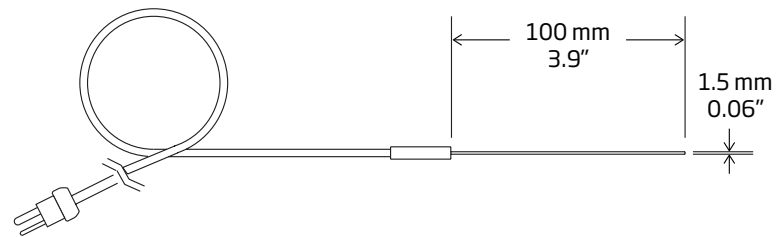


Specifications

Code / Cable Length	Range	Response time (90% of final value)	Probe Dimensions	Sensor	Cable Type	Connector Type
FC766T/1 / 1 m (3.3')	-40 to 250°C (-40 to 482°F)	-	dia 1.9 mm (0.07")	exposed wire	PTFE insulated/straight	K-Type
FC766T/3 / 3 m (9.9')	-40 to 250°C (-40 to 482°F)	-	dia 1.9 mm (0.07")	exposed wire	PTFE insulated/straight	K-Type
FC766T/5 / 5 m (16.4')	-40 to 250°C (-40 to 482°F)	-	dia 1.9 mm (0.07")	exposed wire	PTFE insulated/straight	K-Type
FC766T/7 / 7 m (23')	-40 to 250°C (-40 to 482°F)	-	dia 1.9 mm (0.07")	exposed wire	PTFE insulated/straight	K-Type
FC766T/10 / 10 m (33')	-40 to 250°C (-40 to 482°F)	-	dia 1.9 mm (0.07")	exposed wire	PTFE insulated/straight	K-Type

FC766TZ

Foodcare Wire Stainless Steel Probes for Sous Vide

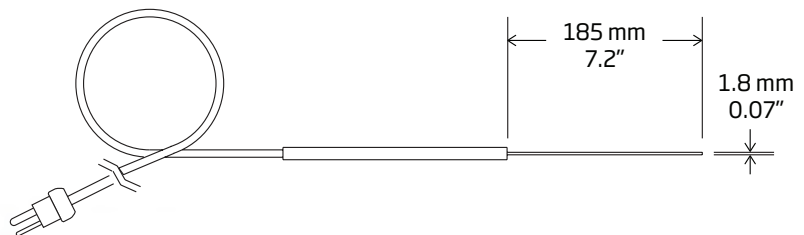


Specifications

Code	Range	Probe Dimensions	Sensor	Cable Type	Cable Length	Connector Type
FC766TZ/30	-40 to 200°C	L 30 mm x dia 1 mm (1.18" x 0.04")	stainless steel	PTFE insulated/straight	1 m (3.3')	K-Type
FC766TZ/60	-40 to 200°C	L 60 mm x dia 1 mm (2.36" x 0.04")	stainless steel	PTFE insulated/straight	1 m (3.3')	K-Type
FC766TZ/120	-40 to 200°C	L 120 mm x dia 1 mm (4.7" x 0.04")	stainless steel	PTFE insulated/straight	1 m (3.3')	K-Type
FC766TZ-0	Spare tape for Sous Vides temperature probe (1 mt)					

FC766TZ2/1

Foodcare Wire Stainless Steel Penetration Probe



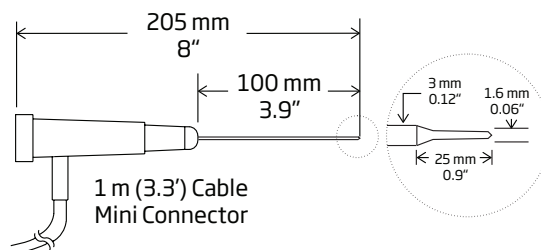
Specifications

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

FC767 Foodcare T-Type Thermocouple Probes

FC767C1

Foodcare Ultra-fast Probe

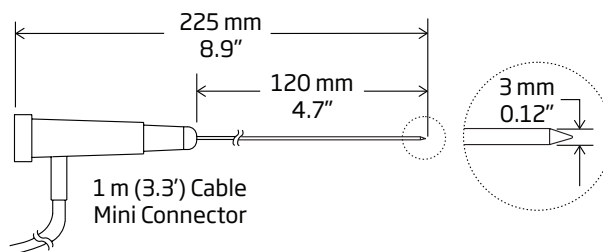


Specifications

Code	Max. Temperature	Accuracy	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
FC767C1			4 seconds	L 100 mm x dia 3 mm (3.9" x 0.12")	AISI 316 stainless steel	Polypropylene (PP)	white	Polyurethane (PUR)/coiled	white / 1 m (3.3')	T-Type

FC767PW

Foodcare Penetration Probe



Specifications

Code	Range	Accuracy	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
FC767PW	300°C (570°F)	±0.6°C (-50 to 100.0°C), ±1.6°C (100.0 to 300°C) /±1.1°F (-58 to 212 °F); ±2.9°F (212 to 573 °F)	15 seconds	L 120 mm x dia 3 mm (4.7" x 0.12")	stainless steel	Polypropylene (PP)	white	Polyurethane (PUR)/coiled	white / 1 m (3.3')	T-Type

FC767 Foodcare T-Type Thermocouple Probes

FC767TS Series

Foodcare Penetration Probe for Semi-Solid Samples

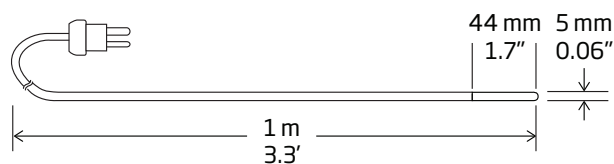


Specifications

Code	Range	Response time (90% of final value)	Probe Dimensions	Probe Material	Probe Handle	Probe Handle Color	Cable Type	Cable Color/Length	Connector Type
HI767TS2	-40 to 250°C (-40 to 482°F)	12 seconds	L 200 mm x dia 6 mm (.66' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	T-Type
HI767TS5	-40 to 250°C (-40 to 482°F)	12 seconds	L 500 mm x dia 6 mm (1.64' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	T-Type
HI767TS7	-40 to 250°C (-40 to 482°F)	12 seconds	L 700 mm x dia 6 mm (2.29' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	T-Type
HI767TS10	-40 to 250°C (-40 to 482°F)	12 seconds	L 1000 mm x dia 6 mm (3.28' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	T-Type
HI767TS14	-40 to 250°C (-40 to 482°F)	12 seconds	L 1400 mm x dia 6 mm (4.59' x 0.24")	stainless steel	stainless steel	silver	coiled cable with PVC insulation	white/ 1 m (3.3')	T-Type

FC767W1/1

Foodcare Wire Probe with Insulated Cable



Specifications

Code	Range	Response time (98% of final value)	Probe Dimensions	Probe Material	Cable Type	Cable Color / Length	Connector Type
FC767W1/1	-40 to 120°C	2min 10 sec	L 44 mm x dia 5mm (1.7" x 0.2")	stainless steel	Polyurethane (PUR)/straight	white/1 m (3.3')	T-Type

FC767Y/1

Foodcare Wire Probe for Ovens and Furnaces



Specifications

Code	Range	Response time (98% of final value)	Probe Dimensions	Probe Material	Cable Type	Cable Length	Connector Type
FC767Y/1	-40 to 1000°C (-40 to 1832°F)	15 seconds	L 1000 mm x dia 1.5 mm (39" x 0.06")	stainless steel	Stainless Steel/straight	1 m (3.3')	T-Type

FC767F/1

Foodcare Wire Probe for Hard to Reach Places



Specifications

Code	Range	Response time (90% of final value)	Probe Dimensions	Sensor	Cable Type	Cable Length	Connector Type
FC767F/1	-40 to 400°C (-40 to 752°F)	14 seconds	dia 2 mm (0.08")	exposed wire	Fiberglass insulated/straight	1 m (3.3')	T-Type

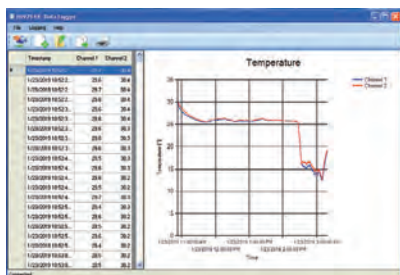
HI148 Series

Waterproof Thermologgers

- IP67 waterproof casing
- 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 8000 samples/channels (for 2-channels models)
- Programmable high and low alarms
- Programmable logging interval from 1 second to 24 hours for 1-channel models, from 2 seconds to 24 hours for 2-channel models
- Storing of temperature at logging interval, or min or max temperature between logging intervals
- Logging delay start from 1 second to 199 hours using the HI92148 PC application or the Log start button
- Non-volatile storage of logging parameters and data in EEPROM
- BEPS (Battery Error Prevention System)
- Security password and lot serial number
- USB Type-C connector
- All HI148 thermologgers are factory calibrated.

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

The thermologgers feature extensive memory capacity: 16,000 samples for 1-channel models and 8000 samples/channel for 2-channel models.



The HI92148 application software (required) supports communication between the logger and a PC running Windows® OS through a USB-C cable. Using the application, data acquisition parameters are user selectable and logged data can be downloaded and stored via USB cable.



USB connection

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



HI148-2
1 external sensor

HI148-3
1 internal and 1 external sensor

HI148-4
2 external sensors

Specifications HI148 Series

Model	Sensors	Temperature Range
HI148-1	T1 internal	-20.0 to 60.0°C / -4.0 to 140.0°F
HI148-2	T1 external	-40.0 to 125.0°C / -40.0 to 257.0°F
HI148-3	T1 internal T2 external	-20.0 to 60.0°C / -4.0 to 140.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI148-4	T1 external T2 external	-40.0 to 125.0°C / -40.0 to 257.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
Resolution		0.1°C (-40.0 to 100.0°C); 0.2°C (temp. >100.0°C); 0.1°F (-40.0 to 190.0°F); 0.3°F (temp. >190.0°F)
Accuracy		±0.5°C (-40.0 to 0.0 and 70.0 to 100.0°C); ±0.4°C (0.0 to 70.0°C); ±1.0°C (>100.0°C) ±1.0°F (-40.0 to 32.0 and 158.0 to 212.0°F); ±0.8°F (32.0 to 158.0°F); ±2.0°F (>212.0°F)
Additional Specifications	Probe	stainless steel probe with 1 m (3.3') silicone cable; 33.5 mm (1.32") length, 3.5 mm (0.14") diameter
	Battery Type / Life	1.5V AAA (3) / approximately 2 years of use
	Environment	-20.0 to 60.0°C (-4.0 to 140.0°F); RH 100%
	Dimensions	107 x 59 x 17 mm (4.2 x 2.3 x 0.7")
	Weight	130 g (4.6 oz)

Ordering Information

HI148-1 (1 internal sensor) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual.
HI148-2 (1 external sensor) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual.
HI148-3 (1 internal, 1 external sensors) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual.
HI148-4 (2 external sensors) is supplied with wall cradle, software, USB type A to C cable, batteries, and instruction manual.

HI144-10 • HI144

T-Logger with Locking Wall Cradle

- **Compact waterproof data logger**
 - LCD displays temperature, high and low alarms, logging status and battery indicator
 - Wall mount with lock
 - USB docking cradle for programming and transferring of data (HI144-10)
- **Programming options**
 - Choice of start: From the PC, a specific date/time, or push button on T-Logger
 - Choice of measurement units: °C or °F to display on LCD
 - High and low alarm set points with indicators on LCD
 - Selectable logging interval in minutes and hours
 - Choice of data management: Store until full, fixed number or wrap around
- **Instrument status review:**
 - Battery life and days used
 - Serial number of device
 - Programmed device settings
- **PC software (using HI144002 USB docking cradle):**
 - Graphic user interface to program settings
 - Data export as an .xls file
 - Built in graphing that can be scaled with quick reference to programmed high and low alarm
- **Stores up to 8,000 measurements**
- **2-year battery life**

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

For building maintenance, this logger can track environmental temperatures of an office or warehouse to ensure that heating or air conditioning thermostats are programmed correctly and hot or cold air is distributed evenly.

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

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



HI144002 USB docking cradle
included with HI144-10

wall cradle

Specifications	HI144
Range	-30.0 to 70.0°C/-22.0 to 158.0°F
Resolution	0.1°C/0.1°F
Accuracy	±0.4°C (-20 to 60°C); ±0.6°C (outside); ±0.7°F (-4 to 140°C); ±1.1°F (outside)
Calibration	factory-calibrated
Data Logging	up to 8,000 samples
Logging Interval	user selectable, from 1 minute to 24 hours
PC Connectivity	HI144002 docking cradle connected to PC with USB cable and running HI92144 software
Battery Type / Life	CR2032 3V lithium ion / approximately 2 years
Environment	0 to 50°C (32 to 122°F); RH 100% (IP67)
Dimensions	60 x 37 x 17 mm (2.4 x 1.5 x 0.7")
Weight	29.4 g (1 oz.) with battery
Ordering Information	<p>HI144 is supplied with HI144 T-Logger, CR2032 lithium ion battery, wall cradle, lock, and instruction manual.</p> <p>HI144-10 is supplied with HI144 T-Logger, HI144002 USB communication cradle, USB flash drive with HI92144 Windows® compatible software, CR2032 lithium ion battery, wall cradle, lock, and instruction manual.</p>



HI9564

HI9565

Pool
Line

HI9564 · HI9565 · HI95654

Thermo-hygrometers

with Dew Point and Calibration
Data-Logging Probe

- Simultaneous RH and temperature measurements on a large, dual-line LCD display
- Selectable temperature unit (°C or °F)
- HI706023 dedicated temperature and RH probe with electronic sensor
- Quick connect probe
- Battery life indication and low battery detection
- Stability indicator
- Auto-off function
- Waterproof casing IP67
- MIN, MAX value and HOLD indicator
- Stability indicator

HI9564, HI9565 and HI95654 are portable thermo-hygrometers designed to measure temperature and Relative Humidity (RH). HI9565 and HI95654 present the added advantage of being able to calculate the dew point from the temperature and RH.

To ensure maximum protection against the effects of humidity and condensation, the instruments are housed in a rugged, water-resistant casing.

The temperature and RH probe is a "smart probe" which consists of a factory calibrated electronic sensor which requires no user calibration. Our "smart probes" will work with any of our meters without the need to recalibrate as the electronic sensor tracks the performance and stores the calibration history directly onto the probe.

Specifications	HI9564	HI9565	HI95654
RH	Range	0.0 to 100.0 % RH	
	Resolution	0.1 % RH	
	Accuracy	±2.5 % RH (0 to 90 % RH); ±3.5 % RH (90 to 100 % RH);	
Dewpoint Temperature (HI9565 only)	Range	-	-20.0 to 60.0°C / -4.0 to 140.0°F
	Resolution	-	0.1°C / 0.1°F
	Accuracy	-	±2°C / ±4°F (50 to 85 % RH and 15 to 40°C); ±4.5 °C / ±9 °F (outside)
Temperature	Range	-10.0 to 60.0°C / 14.0 to 140.0°F	
	Resolution	0.1°C / 0.1°F	
	Accuracy	±0.4 °C / ±0.8 °F	
Probe	HI706023 RH/temperature probe		
Battery Type / Life	1.5V AAA / 10,000 hours of continuous use		
Additional Specifications	Auto-off	User selectable: after 8 minutes, 60 minutes or disabled	
	Environment	0 to 60 °C (32 to 140 °F); 98 % RH non-condensing	
	Dimensions	154 x 63 x 30 mm (6.1 x 2.5 x 1.2")	
	Weight	196 g (6.91 oz.)	
Ordering Information	HI9564, HI9565 and HI95654 are supplied with HI706023 RH/temperature probe, 1.5V AAA batteries (3) and instruction manual.		



HI9564



HI710028
Shockproof orange silicon rubber boot



HI710030
Shockproof green silicon rubber boot



HI710029
Shockproof blue silicon rubber boot