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Thermometers

Introduction

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 one of the most important variables today in research, as well as in production. Up to a few decades ago, thermometers had remained virtually unchanged. They were mainly either glass or dial/metal type.

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 persons health, as well as to the environment. For these reasons, an alternative way of measuring temperature has become necessary.

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 are changing 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. Mechanical stress is no longer a worry with an electronic thermometer. Rain, cold, dust and other natural obstacles common to field measurements are overcome with our rugged instruments.

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:

$$K = °C + 273.15$$

The Fahrenheit scale uses Fahrenheit (°F) units, where the temperature of boiling water is taken of 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 body temperature as 96°F. The relationship between the Fahrenheit and Celsius scales is calculated by:

$$°F = °C \times 9/5 + 32$$

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 variations 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°C 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 °C did not jeopardize a process. From the time that 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 government regulations. Soon after, HANNA became the market leader in Europe as a result of the technological solutions offered to our users.

User Calibration

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.

CAL CHECK™ 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 ±0.02°C.

The CAL CHECK™ system acts by substituting the sensor with an internal resistor, which corresponds to 0°C, and thus simulating 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:

- **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, and 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 ±0.3°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°C 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 make sure that the instrument reads the simulated value.

Thermometers

Introduction

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)

$$r = ro\ (1 + aT)$$

where

ro = characteristic resistivity of material

a = temperature resistance coefficient of material

The temperature resistance coefficient is the parameter that determines if the resistivity variation is positive (as with the Positive Temperature Coefficient sensors) or negative (as with the Negative Temperature Coefficient 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.

Pt100 Thermometers

The operating principle of resistance thermometers is based on the increase of electric resistance of metal conductors (RDT: 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, a noble metal, is the one that can measure temperatures throughout a wide range; from -251 (-419.8°F) to 899°C (1650.2°F), with a linear behavior.

Platinum RTD thermometers were common in the seventies but now they have 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 1000Ω (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, high temperature surfaces and hazardous areas, such as high voltage wires.

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 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

* Given for e-H2 , which is hydrogen at the equilibrium concentration of the ort and para molecular forms.

Product Spotlights

HI 935007N • HI 935007NS

K-Type Thermocouple Thermometer with Direct Measurement Probe

14.26

HI 935007N and HI 935007NS extends the range of portable HANNA thermometers by measuring temperatures as high as 900°C. Their attractive price point makes it possible for every operator to carry his or her own professional instrument.

The fixed HI 766C penetration probe with 1 m (3.3') flexible cable is also supplied with the instrument. Advanced battery management features include a display of remaining battery power at startup, low battery warning and BEPS battery error prevention system.

HI 93510 • HI 93510N

Thermistor Thermometer

14.30

HI 93510 is a high performance, waterproof thermometer tailor made for lab and field use. 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. Battery level is shown at startup and a low battery warning with BEPS assures long periods of trouble free use.

The HI 93510N offers all the features of the HI 93510 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, HI 93510N has a user-activated backlit display.

HI 93501N • HI 93501NS

Thermistor Thermometer for the Food Industry

14.28

HI 93501N is a waterproof thermometer designed to be used daily in food applications such as industrial kitchens and catering. The "S" version also adds a stability indicator bargraph and HOLD button to freeze readings on the LCD.

The HI 762PWL penetration probe is included. The probe can be replaced with a vast assortment of HI 762 probes at your disposal for specific applications.

The display indicates the remaining battery power at startup then continuously checks the battery level and warns the user with ample time to change the battery. When low battery power may affect your results, the meter will shut down and ensure that accuracy is not compromised.

GUIDE	K-type	K,J,T - type	Range	CAL Button	Calibration Check™	PC Compatibility	BEPS	HOLD Feature	Waterproof	Autoranging	Logging	Alarm	Interchangeable Probe	Multiple Channels	Backlit LCD	Stability Bargraph	Page
Thermocouple Thermometers																	
HI 935005	•		°C/°F				•	•	•				•				14.8
HI 935005N	•		°C/°F	•			•	•	•				•		•		14.8
HI 935002	•		°C/°F				•		•				•	•			14.9
HI 935009	•		°C/°F	•			•		•				•	•	•		14.9
HI 93531	•		°C/°F				•	•	•				•				14.10
HI 93531N	•		°C/°F	•			•	•	•				•		•		14.10
HI 93531R	•		°C/°F	•		•	•	•	•				•		•		14.10
HI 93532	•		°C/°F				•	•	•				•	•			14.11
HI 93532N	•		°C/°F	•			•	•	•				•	•	•		14.11
HI 93532R	•		°C/°F	•		•	•	•	•				•	•	•		14.11
HI 93530	•		°C/°F				•	•					•				14.12
HI 93530N	•		°C/°F	•			•	•					•		•		14.12
HI 9063	•		°C/°F					•		•			•				14.13
HI 9063C	•		°C/°F					•		•			•				14.13
HI 93551		•	°C/°F				•	•	•				•				14.14
HI 93551N		•	°C/°F	•			•	•	•				•		•		14.14
HI 93551R		•	°C/°F	•		•	•	•	•				•		•		14.14
HI 93542		•	°C/°F				•	•	•				•	•			14.15
HI 93552		•	°C/°F	•			•	•	•				•	•	•		14.15
HI 93552R		•	°C/°F	•		•	•	•	•				•	•	•		14.15
HI 935007N	•		°C		•		•		•								14.26
HI 935007NS	•		°C		•		•	•	•							•	14.26
Thermistor Thermometers																	
HI 9241			°C		•		•		•				•				14.27
HI 93501N			°C		•		•		•				•				14.28
HI 93501NS			°C		•		•	•	•				•			•	14.28
HI 93503			°C		•		•	•	•				•			•	14.29
HI 93510			°C/°F				•	•	•				•				14.30
HI 93510N			°C/°F	•			•	•	•				•		•		14.30
HI 93512			°C/°F				•	•	•				•	•			14.31
HI 93522			°C/°F	•			•	•	•				•	•	•		14.31
Pt100 Thermometers																	
HI 955501			°C										•				14.38
HI 955502			°C														14.38
Infrared Thermometers																	
HI 99551			°C/°F					•									14.40
HI 99556			°C/°F					•									14.40
HI 99550-00			°C					•									14.41
HI 99550-01			°F					•									14.41
Temperature Dataloggers																	
HI 141			°C/°F			•			•		•	•		•			14.42
HI 140			°C/°F			•	•		•		•	•					14.44
HI 142 / HI 504903			°C/°F			•	•		•		•						14.45
HI 143			°C/°F			•			•		•	•					14.46

HI 935005 • HI 935005N

K-Type Thermocouple Thermometers

- **High accuracy ±0.2%**
- **Waterproof casing**
- **High/Low function**
- **Instantly °C to °F shifting**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**
- **Up to 1600 battery life**
- **Backlit display (N version)**
- **One point temperature calibration (N version)**

HI 935005 series are waterproof, K-type thermometers offering accurate temperature measurements in a wide range as well as a 1600 hours of battery life.

These units display current temperature along with the minimum and maximum values achieved during the measuring session on the LCD.

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 CLEAR button restarts the evaluation of high and low values.

HI 935005N features a user-activated backlight for low or no light conditions. A CAL button to allow the operator 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.

A wide variety of interchangeable probes are available to meet your specific needs. Optional rubber boots are available.

ORDERING INFORMATION

HI 935005 and **HI 935005N** are supplied with batteries, protective case and instructions

PROBES

HI 766C Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable

HI 766D Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

HI 766E1 General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007 Shockproof rubber boot, blue

HI 710008 Shockproof rubber boot, orange

SPECIFICATIONS	HI 935005	HI 935005N
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	HI 766 series K-type thermocouple (not included)	
CAL Button	N/A	yes
Backlit LCD	N/A	yes
Battery Type / Life	1.5V AA (3) / approximately 1600 hours of continuous use (with backlight off); HI 935005 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.)	

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

2-channel, K-Type Thermocouple Thermometers

- **Dual input channels**
- **One point calibration (HI 935009)**
- **High accuracy ±0.2%**
- **Waterproof casing**
- **High/Low function**
- **°C to °F shifting**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**
- **Backlit display (HI 935009)**
- **Up to 1600 battery life**
- **Reading storage**

HI 935002 and HI 935009 are 2-channel, waterproof, K-type thermometers that offer accurate temperature measurements in a wide range as well as a 1600 hours of battery life.

These units display current temperature along with the minimum and maximum 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.

HI 935009 features a user-activated backlight for low or no light conditions. The CAL button allows the operator 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	HI 935002	HI 935009
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	HI 766 series K-type thermocouple (not included)	
CAL Button	N/A	yes
Backlit LCD	N/A	yes
Battery Type / Life	1.5V AA (3) / approx. 1600 hours of continuous use (with backlight off); HI 935009 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.)	

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

ORDERING INFORMATION

HI 935002 and **HI 935009** are supplied with batteries and instructions.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

HI 93531 • HI 93531N • HI 93531R

0.1° Resolution K-Type Thermocouple Thermometers

- High accuracy ±0.2%
- One point calibration (N and R versions)
- Waterproof casing
- High/Low function
- °C to °F shifting
- HOLD function
- BEPS and low battery warning
- Battery life indicator at start-up
- Auto-off capability
- Backlit display (N and R versions)
- Reading storage
- 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. These 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 CLEAR button restarts the evaluation of high and low values.

HI 93531N and HI 93531R feature 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. HI 93531R adds RS232 output that allows for data transfer to a PC or printer.

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.

ORDERING INFORMATION

HI 93531, **HI 93531N** and, **HI 93531R** are supplied with batteries and instructions.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 92000	Windows® compatible software
HI 920011	Serial cable for PC connection

SPECIFICATIONS	HI 93531	HI 93531N	HI 93531R
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	HI 766 series K-type thermocouple (not included)		
CAL Button	N/A	yes	yes
Backlit LCD	N/A	yes	yes
RS232	N/A	N/A	yes
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 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.)		

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

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

HANNA instruments

With Great Products, Come Great Results™

Dual-input, K-Type Thermocouple Thermometers

- **Dual input**
- **High accuracy ±0.2%**
- **Waterproof casing**
- **High/Low function**
- **°C to °F shifting**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**
- **Auto-off capability**
- **Backlit display (N and R versions)**
- **One point calibration (N and R versions)**
- **PC and printer compatible (R version)**

Conditions often require the measurement of two samples at the same time. The HI 93532 series feature two built in channels for two K-type probe connectors.

These thermometers display current temperature along with the high and low values in either channel. You can also see the difference between the two channels simultaneously with the high and low of the difference.

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

The HI 93532N, HI 93532R feature a user-activated backlight for low or no light conditions. The CAL button allows the operator to perform a simple one point calibration in an ice bath at 0°C when probe interchange occurs.

HI 93532R adds RS232 output that allows for data transfer to a PC or printer.

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	HI 93532	HI 93532N	HI 93532R
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	HI 766 series K-type thermocouple (not included)		
CAL Button	N/A	yes	yes
Backlit LCD	N/A	yes	yes
RS232	N/A	N/A	yes
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 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.)		

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

ORDERING INFORMATION

HI 93532, **HI 93532N** and **HI 93532R** are supplied with batteries and instructions.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 92000	Windows® compatible software
HI 920011	Serial cable for PC connection

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

HI 93530 • HI 93530N

0.1° Resolution K-Type Thermocouple Thermometers

- **Immediate °C to °F shifting**
- **High resolution**
- **Waterproof casing**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**
- **One point calibration (N version)**
- **Backlit display (N version)**

HI 93530 and HI 93530N are waterproof thermometers that can read with a resolution of 0.1 in the -149.9 to 999.9°C (-24.9 to 999.9°F) range.

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.

For high accuracy, HI 93530N features a CAL button to allow the operator a simple one point calibration in an ice bath at 0°C when probe interchange occurs.

HI 93530N also incorporates a user-activated backlight for low or no light conditions.

Remaining battery power is displayed at start-up and these Instruments are equipped with BEPS (Battery Error Prevention System) which alerts the user in the event that low battery power could adversely affect readings.

Several interchangeable probes are available to meet your specific needs. Optional rubber boots are also available.

ORDERING INFORMATION

HI 93530 and **HI 93530N** are supplied with batteries and instructions.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 710018	Spare protective case

SPECIFICATIONS	HI 93530	HI 93530N
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	HI 766 K-type thermocouple (not included)	
CAL Button	N/A	yes
Backlit LCD	N/A	yes
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 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.)	

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

Heavy-duty K-Type Thermocouple Thermometer

- **Auto ranging**
- **Enhanced accuracy**
- **Waterproof casing**
- **High/Low function**
- **°C to °F shifting**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**

HI 9063 K-type thermocouple thermometer features auto ranging, enhanced accuracy, and display current temperature along with the high and low extremes achieved during the measuring session on the LCD.

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 CLEAR button assigns the reading to high and low temperature values.

HI 9063 is equipped with BEPS (Battery Error Prevention System) which alerts the user in the event that low battery power could adversely affect readings.

SPECIFICATIONS	HI 9063
Range	-50.0 to 1350°C -58.0 to 2462°F
Resolution	0.1°C (up to 199.9°C); 1°C (outside) 0.1°F (up to 399.9°F); 1°F (outside)
Accuracy	±0.2% F.S. (for 1 year, excluding probe error)
Probe	HI 766 series K-type thermocouple
Battery Type / Life	1.5V AA (4) / approximately 2000 hours of continuous use
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
Weight	500 g (1.1 lbs.)

ORDERING INFORMATION

HI 9063 is supplied with batteries and instructions.
HI 9063C is supplied with HI 9063, HI 766HD probe handle, HI 766PE1, HI 766PB, HI 766PD probes, batteries, rugged carrying case and instructions.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710021	Spare protective case
HI 710141	Rugged carrying case

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

HI 93551 • HI 93551N • HI 93551R

K, J, T-Type Thermocouple Thermometers

- Accepts K, J, T - thermocouples
- Waterproof casing
- High/Low function
- °C to °F shifting
- HOLD function
- BEPS and low battery warning
- Battery life indicator at start-up
- Auto-off capability
- One point calibration (N and R versions)
- Backlit display (R version)
- PC and printer compatible (R version)

These instruments offer the ability to take temperature measurements with different types of thermocouples and are equipped with a single button that switches between K-type, J-type or T-type thermocouples.

The HOLD button freezes the display to allow the user time to record readings. The CLEAR button restarts the evaluation of high and low values.

These thermometers display the current temperature along with the high and low extremes achieved during measurement.

For high accuracy, HI 93551N and HI 93551R feature a CAL button to allow the operator 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.

HI 93551R adds RS232 output that allows for data transfer to a PC or printer.

ORDERING INFORMATION

HI 93551, **HI 93551N** and **HI 93551R** are supplied with batteries, instructions and protective case.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766D	Air/gas, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 92000	Windows® compatible software
HI 920011	Serial cable for PC connection

SPECIFICATIONS		HI 93551	HI 93551N	HI 93551R
Range	K	-200.0 to 999.9°C and 1000 to 1371°C; -328.0 to 999.9°F and 1000 to 2500°F		
	J	-200.0 to 999.9°C; -328.0 to 999.9°F and 1000 to 1832°F		
	T	-200.0 to 400.0°C; -328.0 to 752.0°F		
Resolution	K	0.1°C (-149.9 to 999.9°C); 0.2°C (-200.0 to -150.0°C); 1°C (1000 to 1371°C); 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 (1000 to 2500°F)		
	J	0.1°C (-200.0 to 999.9°C); 0.1°F (-149.9 to 999.9°F); 0.2°F (-328.0 to -150.0°F); 1°F (1000 to 1832°F)		
	T	0.1°C (-149.9 to 400.0°C); 0.2°C (-200.0 to -150.0°C); 0.1°F (0.0 to 752.0°F); 0.2°F(-270.0 to -0.1°F); 0.3°F (-328.0 to -270.1°F)		
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		HI 766 series K-type thermocouple (not included)		
CAL Button		N/A	yes	yes
Backlit LCD		N/A	N/A	yes
RS232		N/A	N/A	yes
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 50°C (14 to 122°F); RH max 100%		
Dimensions / Weight		150 x 80 x 36 mm (5.9 x 3.1 x 1.4") / 235 g (8.3 oz.)		

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

Dual-channel, K, J, T-Type Thermocouple Thermometers

- **Accepts K, J, T – thermocouples**
- **Waterproof casing**
- **High/Low function**
- **°C to °F shifting**
- **HOLD function**
- **BEPS and low battery warning**
- **Battery life indicator at start-up**
- **Auto-off capability**
- **One point calibration (HI 93552 and HI 93552R)**
- **Backlight display (HI 93552R)**
- **PC and printer compatible (HI 93552R)**

HI 93542 and HI 93552 are dual-channel waterproof K, J, and T-type thermocouple thermometers that can switch between thermocouple types at a touch of a button.

At any time, users can switch views to see all information on either channel, display current temperature or average along with the high and low values. Users can also see the difference between the two channels simultaneously along with the high and low of the difference.

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 CLEAR button restarts the evaluation of high and low values.

For high accuracy, HI 93552 and HI 93552R feature a CAL button to allow the operator a simple one point calibration in an ice bath at 0°C when probe interchange occurs.

HI 93552R adds RS232 output that allows for data transfer to a PC or printer.

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		HI 93542	HI 93552	HI 93552R
Range	K	-200.0 to 999.9°C and 1000 to 1371°C; -328.0 to 999.9°F and 1000 to 2500°F		
	J	-200.0 to 999.9°C; -328.0 to 999.9°F and 1000 to 1832°F		
	T	-200.0 to 400.0°C; -328.0 to 752.0°F		
Resolution	K	0.1°C (-149.9 to 999.9°C); 0.2°C (-200.0 to -150.0°C); 1°C (1000 to 1371°C); 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 (1000 to 2500°F)		
	J	0.1°C (-200.0 to 999.9°C); 0.1°F (-149.9 to 999.9°F); 0.2°F (-328.0 to -150.0°F); 1°F (1000 to 1832°F)		
	T	0.1°C (-149.9 to 400.0°C); 0.2°C (-200.0 to -150.0°C); 0.1°F (0.0 to 752.0°F); 0.2°F(-270.0 to -0.1°F); 0.3°F (-328.0 to -270.1°F)		
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		HI 766 series K-type thermocouple (not included)		
CAL Button		N/A	yes	yes
Backlit LCD		N/A	yes	yes
RS232		N/A	N/A	yes
Battery Type / Life		1.5V AA (3) / approximately 500 hours of continuous use (with backlight off); auto-off: after 60 minutes of non-use (HI 93542); selectable after 8 or 60 minutes of non-use (HI 93552) (can be disabled for all models)		
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

HI 93542, **HI 93552** and **HI 93552R** are supplied with batteries, instructions and protective case.

PROBES

HI 766C	Penetration, stainless steel K-type thermocouple temperature probe with 1 m cable
HI 766E1	General purpose/penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 92000	Windows® compatible software
HI 920011	Serial cable for PC connection

A wide variety of probes are available, see the end of this Thermocouple Thermometer Section.

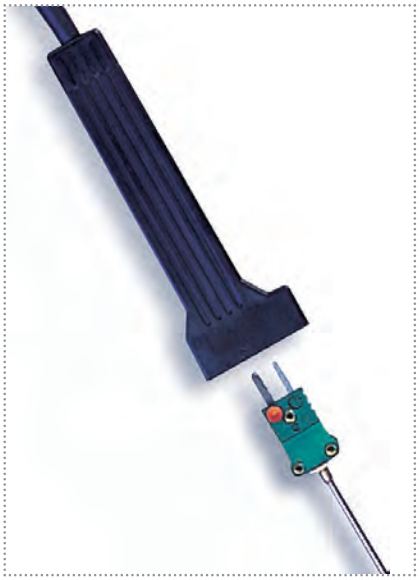
HI 766

HI 766 K-Type Thermocouple Probes

HI 766Px Series, Probes with Detachable Handle

The HI 766Px 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.

All probes are made with stainless steel for long life and easy cleaning. The HI 766Px series includes a wide range of probes for measurement of liquids, air, gas, penetration in semisolids, as well as curved, planed or hard to reach surfaces. In addition, models are available with interchangeable or fixed handles for maximum versatility.



HI 766HD, Probe Interchangeable 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 HI 766Px probe.

HI 766EX, Extension Cable

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

HI 766PA, Roller Surface Probe

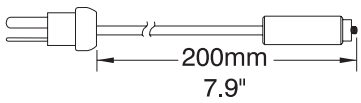
This probe is designed to measure the temperature of convex surfaces.

SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE LENGTH	PROBE
HI 766PA	convex surfaces, moving rollers	320°C (600°F)	7 seconds	280 mm (11')	stainless steel

HI 766PB, Surface Probe

Temperature probe for measurements on surfaces.

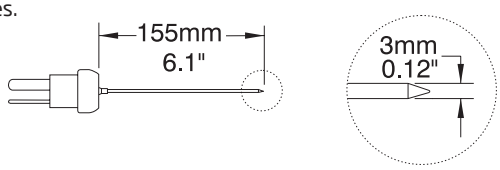


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766PB	hot solids, furnaces, molds	650°C (1200°F)	8 seconds	L 200 mm x dia 16 mm (7.9 x 0.6")	stainless steel

HI 766PC, Penetration Probe

K-type thermocouple probe with sharp tip for penetration of semi-solid samples.

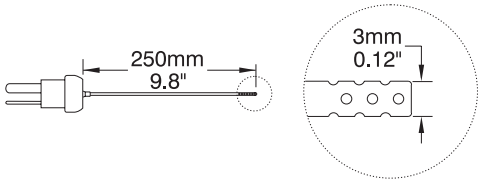


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766PC	semi-solids, meat, rubber	900°C (1650°F)	15 seconds	L 155 mm x dia 3 mm (6.1 x 0.12")	stainless steel

HI 766PD, Probe for Air and Gas

K-type thermocouple probe for measuring the temperature of air and gases.

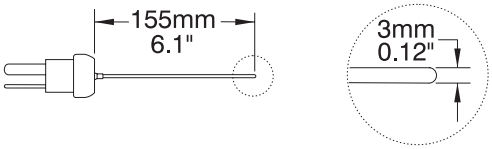


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766PD	air, gases	300°C (570°F)	20 seconds	L 250 mm x dia 3 mm (9.8 x 0.12")	stainless steel

HI 766PE1, General Purpose Probe

General purpose, penetration probe.

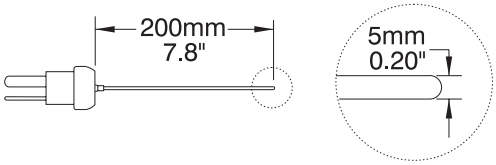


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766PE1	liquids, air, gases	900°C (1650°F)	6 seconds	L 155 mm x dia 3 mm (6.1 x 0.12")	stainless steel

HI 766PE2, General Purpose Probe

General purpose, penetration probe.



SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766PE2	liquids, air, gases	900°C (1650°F)	6 seconds	L 200 mm x dia 5 mm (7.8 x 0.2")	stainless steel

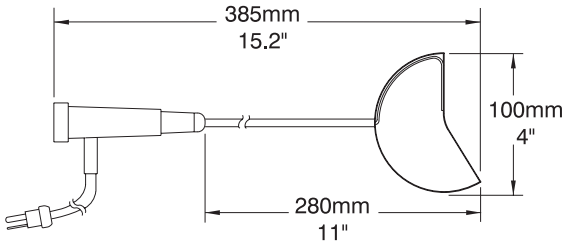
HI 766

HI 766 K-Type Thermocouple Probes with Handle

HI 766A, Roller Surface Probe

This probe is designed to measure the temperature of convex surfaces.

1 m (3.3') Cable
Mini Connector



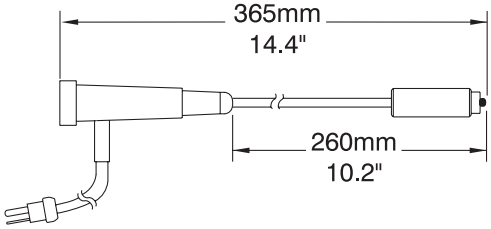
SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766A	convex surfaces, moving rollers	320°C (600°F)	7 seconds	280 mm (11') (probe length)	stainless steel

HI 766B, Surface Probe

Temperature probe for measurements on surfaces.

1 m (3.3') Cable
Mini Connector



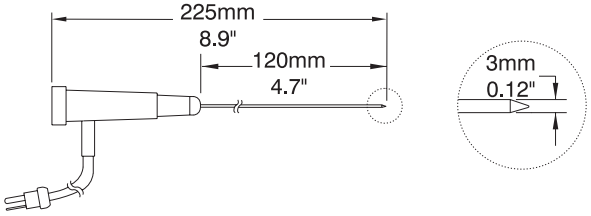
SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE
HI 766B	hot solids, furnaces, molds	650°C (1200°F)	8 seconds	L 200 mm x dia 16 mm (7.9 x 0.6")	stainless steel

HI 766C, Penetration Probe

K-type thermocouple probe with sharp tip for penetration of semi-solid samples.

1 m (3.3') Cable
Mini Connector

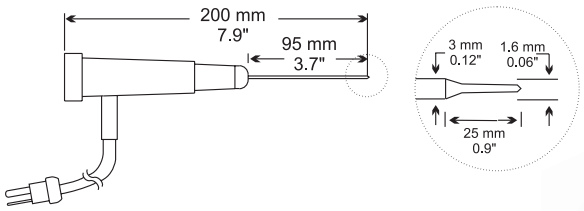


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE COLOR
HI 766C	semi-solids, meat, rubber	900°C (1650°F)	15 seconds	L 155 mm x dia 3 mm (6.1 x 0.12")	stainless steel	green
HI 766CL	semi-solids, meat, rubber	900°C (1650°F)	15 seconds	L 310 mm x dia 5 mm (12.2 x 0.19")	stainless steel	green
HI 766CA	semi-solids, meat, rubber	900°C (1650°F)	15 seconds	L 155 mm x dia 3 mm (6.1 x 0.12")	stainless steel	green, no connector

HI 766C1, Ultra-Fast Penetration Probe

Penetration probe with fast response time



1 m (3.3') Cable
Mini Connector

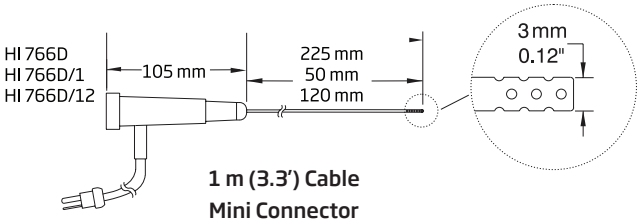
HI 766CAR

SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE COLOR
HI 766C1	semi-solids, food	300°C (570°F)	4 seconds	L 95 mm x dia 1.6 mm (3.7 x 0.06")	stainless steel	green
HI 766C1/G	semi-solids, food	300°C (570°F)	4 seconds	L 95 mm x dia 1.6 mm (3.7 x 0.06")	stainless steel	yellow
HI 766CAR	rubber, car tires	300°C (570°F)	4 seconds	L 10 mm x dia 1.6 mm (.39 x 0.06")	stainless steel	black

HI 766D and HI 766D/12, Probes for Air and Gas

K-type thermocouple probe for measuring the temperature of air and gases.



1 m (3.3') Cable
Mini Connector

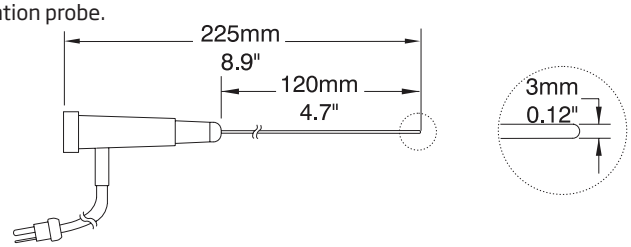
SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE COLOR
HI 766D	air, gases	300°C (570°F)	20 seconds	L 245 mm x dia 3 mm (9.6 x 0.12")	stainless steel	green
HI 766D/1	air, gases	300°C (570°F)	20 seconds	L 50 mm x dia 3 mm (9.6 x 0.12")	stainless steel	green
HI 766D/12	air, gases	300°C (570°F)	20 seconds	L 120 mm x dia 3 mm (4.7 x 0.12")	stainless steel	green

HI 766E1, General Purpose Probe

General purpose, penetration probe.

1 m (3.3') Cable
Mini Connector



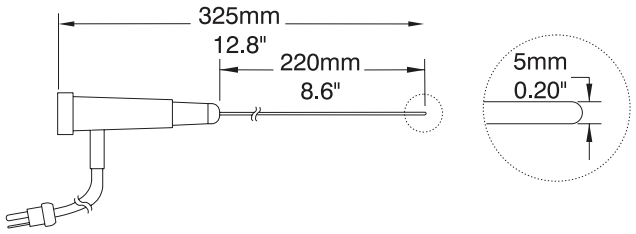
SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE LENGTH
HI 766E1	liquids, air, gases	900°C (1650°F)	6 seconds	L 120 mm x dia 3 mm (4.7 x 0.12")	stainless steel	1 m (3.3')

HI 766E2, General Purpose Probe

General purpose, penetration probe

1 m (3.3') Cable
Mini Connector

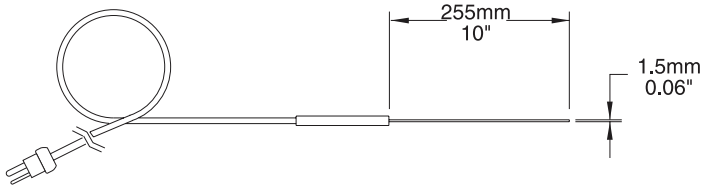


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE LENGTH
HI 766E2	liquids, air, gases	900°C (1650°F)	6 seconds	L 220 mm x dia 5 mm (8.5 x 0.2")	stainless steel	1 m (3.3')
HI 766E2/20	liquids, air, gases	900°C (1650°F)	6 seconds	L 220 mm x dia 5 mm (8.5 x 0.2")	stainless steel	20 m (66')
HI 766E2A	liquids, air, gases	900°C (1650°F)	6 seconds	L 220 mm x dia 5 mm (8.5 x 0.2")	stainless steel	1 m (3.3'), no connector

HI 766F, High Temperature Probe

Probe with flexible sheath without handle, designed to measure high temperatures.



SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	CABLE LENGTH
HI 766F	high temperature	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	AISI 316 stainless steel	1 m (3.3')
HI 766F/3	high temperature	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	AISI 316 stainless steel	3 m (9.9')

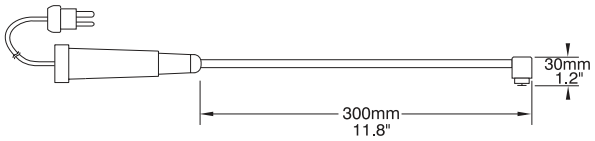
HI 766 K-Type Thermocouple Probes for Specific Applications

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.

HI 766B1, 90° Angle Surface Probe

Probe for measuring the temperature of 90° angle surfaces.

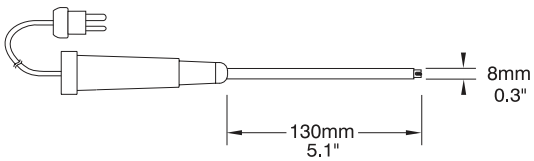


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	SENSOR
HI 766B1	hard to reach surfaces	450°C (840°F)	8 seconds	L 300 mm x dia 30 mm (11.8 x 1.2")	stainless steel	spring-loaded

HI 766B2, Surface Probe

Probe for measuring the temperature of round surfaces.

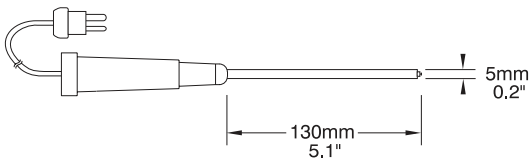


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	SENSOR
HI 766B2	solids, furnaces, molds	900°C (1650°F)	3 seconds	L 130 mm x dia 8 mm (5.1 x 0.3")	stainless steel	spring-loaded

HI 766B3, Small Surface Probe

Probe for measuring the temperature of small surfaces.

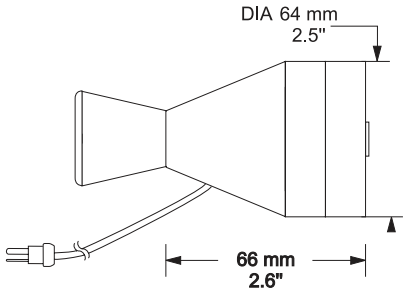


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	PROBE	SENSOR
HI 766B3	small surfaces	200°C (390°F)	6 seconds	L 130 mm x dia 5 mm (5.1 x 0.2")	stainless steel, insulated tube	spring-loaded

HI 766B4, Grill Surface Probe with Jacketed Cable

Probe for measuring the temperature of hot grill surfaces.

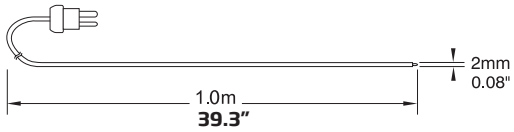


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (63.2% F.S.)	PROBE DIMENSIONS	SENSOR	WIRE LENGTH
HI 766B4	hot grills for food cooking	250°C (482°F)	6 seconds	L 66 mm x dia 64 mm (2.6 x 2.5")	PTFE contact surface with replaceable stainless steel sensor (HI 7664B4S)	70 cm (27.6") length, protected with stainless steel jacket

HI 766F1, Wire Temperature Probe

Wire probe, designed to access hard to reach places. Probe does not incorporate a handle.

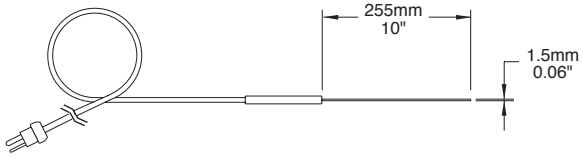


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (63.2% F.S.)	PROBE DIMENSIONS	SENSOR	WIRE LENGTH
HI 766F1	hard to reach areas	480°C (900°F)	1 second	dia 2 mm (0.08")	exposed wires	1 m (3.3')
HI 766F1/3	hard to reach areas	480°C (900°F)	1 second	dia 2 mm (0.08")	exposed wires	3 m (9.9')
HI 766F1/5	hard to reach areas	480°C (900°F)	1 second	dia 2 mm (0.08")	exposed wires	5 m (16.4')
HI 766F1/50	hard to reach areas	480°C (900°F)	1 second	dia 2 mm (0.08")	exposed wires	50 m (164')

HI 766Z, Wire Temperature Probe

Wire probe, designed to measure temperature inside ovens.

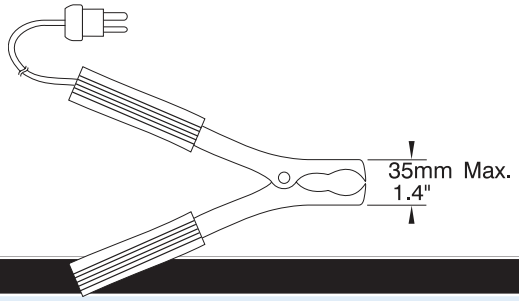


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	SENSOR	CABLE LENGTH
HI 766Z	ovens	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	1.7 m (5.6')
HI 766Z/3	ovens	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	3 m (9.9')
HI 766Z/5	ovens	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	5 m (16.4')
HI 766Z/7	ovens	1100°C (2000°F)	4 seconds	L 255 mm x dia 1.5 mm (10 x 0.06")	stainless steel	7 m (22.9')

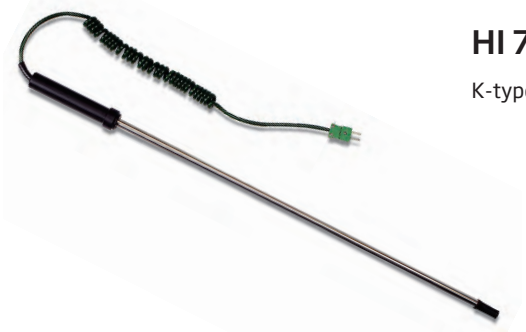
HI 766TV1, Pipe Clamp Probe

Probe for measuring the temperature of pipes and tubes.



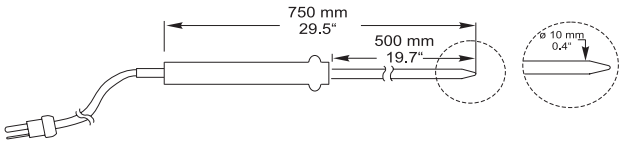
SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	CLAMP OPENING DIAMETER	SENSOR
HI 766TV1	pipes, tubes	200°C (390°F)	8 seconds	max 35 mm (1.4")	housed inside the clamp



HI 766TR1, Penetration Probe

K-type thermocouple probe with sharp tip for penetration of semi-solid samples.

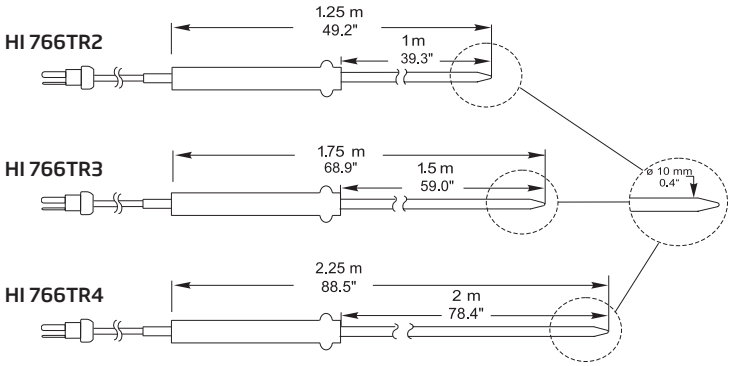


SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE DIMENSIONS	SENSOR
HI 766TR1	semi-solids, liquids	250°C (482°F)	10 seconds	L 500 mm x dia 10 mm (19.7 x 0.4")	stainless steel

HI 766TR2, HI 766TR3, HI 766TR4, Penetration Probes

K-type thermocouple probes with sharp tip for penetration of semi-solid samples.



SPECIFICATIONS

CODE	APPLICATION	MAX TEMPERATURE	RESPONSE TIME (90% OF FINAL VALUE)	PROBE LENGTH	SENSOR
HI 766TR2	semi-solids, liquids	250°C (482°F)	10 seconds	1 m (3.3')	stainless steel
HI 766TR3	semi-solids, liquids	250°C (482°F)	10 seconds	1.5 m (5')	stainless steel
HI 766TR4	semi-solids, liquids	250°C (482°F)	10 seconds	2 m (6.6')	stainless steel

HACCP & Food Quality Testing

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 has manufactured a vast range of products with the necessary accuracy and reliability to check the quality of food in all phases of preparation and distribution.

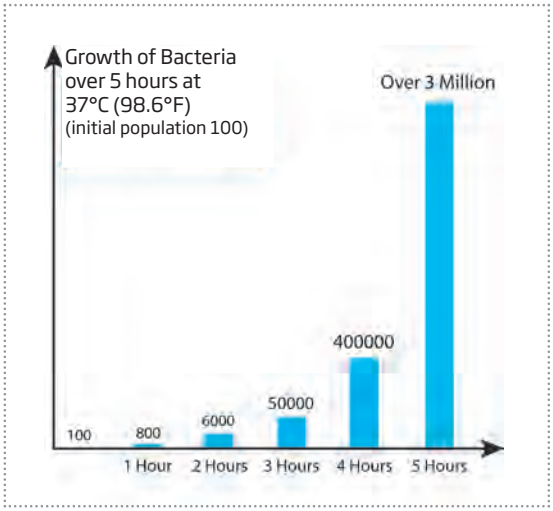
Much of HANNA's portable and pocket thermometer lines have become synonymous with temperature control in restaurants and catering facilities.

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, you can choose from 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 it's 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 and 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 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 in the market, beer is pasteurized at around 60°C (140°F) after it has been bottled to eliminate the presence of microorganisms.

Controlling temperature is important in beer, wine and soft drink production.

Milk and Dairy Products

Milk is checked for impurities and infections upon collection. During storage, the temperature of stored 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 a 95% and it 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).

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 and 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.

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.

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 do not exceed 80°C (176°F).

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 that varies from 24°C (75.2°F) for iodine and ammonia to 49°C (120.2°F) for chlorine.

HI 935007N • HI 935007NS

K-Type Thermocouple Thermometer with Penetration Probe

- **Autoranging**
- **High accuracy ±0.2°C**
- **Waterproof**
- **Calibration Check™ at startup**
- **Damaged probe indicator**
- **Stability indicator (HI 935007NS)**
- **HOLD (HI 935007NS)**
- **BEPS and low battery warning**
- **Battery level indicator at startup**
- **Compact, heavy-duty, and waterproof**
- **Easy to clean and keep clean**

HI 935007 series are portable thermometers that measure temperatures as high as 1350°C. The resolution remains 0.1 up to 199.9°C and automatically changes to 1.0 above.

The fixed HI 766C penetration probe with 1 m (3.3') flexible cable is also supplied with the instrument.

With the optional protective rubber boot, HI 935007N can be used anywhere with maximum impact protection. These features along with a wide measurement range make HI 935007N extremely popular in catering, food preparation and restaurants.

The HI 935007NS adds a HOLD button to freeze the display to allow the user time to record readings and a stability indicator.

HI 935007's attractive price makes it possible for every operator to carry his or her own professional instrument.

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	HI 935007N • HI 935007NS
Range	-50.0 to 199.9°C; 200 to 1350°C
Resolution	0.1°C (up to 199.9°C); 1°C (outside)
Accuracy	±0.2% full scale (excluding probe error)
Probe	HI 766C penetration, stainless steel K-type thermocouple temperature probe with 1 m (3.3) cable(fixed)
Battery Type	1.5V AAA (3) / approximately 1000 hours of continuous use; auto-off after 8 minutes of non-use
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")
Weight	205 g (7.2 oz.)

ORDERING INFORMATION

HI 935007N and **HI 935007NS** are supplied with HI 766C fixed temperature probe, batteries, instructions and hard carrying case.

ACCESSORIES

HI 710023	Orange protective rubber boot
HI 710024	Blue protective rubber boot

HANNA instruments

With Great Products, Come Great Results™

Thermistor Thermometer with Pre-calibrated Probe

- **High accuracy ±0.4°C**
- **Calibration Check™ at startup**
- **Missing/damaged probe indicators**
- **Compact, heavy-duty, and waterproof**
- **BEPS and low battery warning**
- **Battery level indicator at startup**
- **Easy to clean and keep clean**

HI 9241 features a new streamlined design with bottom probe connection. This instrument measures a wide range from -50.0°C to 150.0°C with exceptional accuracy. This meter is simple to operate and is supplied complete with the user-replaceable HI 765PW general purpose, penetration probe.

Users may exchange the probe with any in the HI 765 series without requiring recalibration. A diverse assortment of HI 762 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.

Users can check the meter's accuracy at any time with HANNA calibration keys. Simply plug the key into the meters probe input and if the display value does not match those of the key, the meter is due for recalibration.

SPECIFICATIONS	HI 9241
Range	-50.0 to 150.0°C
Resolution	0.1°C
Accuracy (@20°C/68°F)	±0.4°C, excluding probe error
Probe	HI 765PW general purpose/penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable (included)
Battery Type/Life	1.5V AAA (3) /approximately 2000 hours of continuous use; auto-off after 8 minutes of inactivity
Environment	-10 to 50°C (14 to 122°F); RH max 100% non-condensing
Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")
Weight	205 g (7.2 oz.)

ORDERING INFORMATION

HI 9241 is supplied with HI 765PW temperature probe, batteries, instructions and rugged carrying case.

PROBES

HI 765PW	General purpose/penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765A	Air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765L	Air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765W	Thermistor wire, stainless steel temperature probe with 1 m cable

ACCESSORIES

HI 710023	Shockproof rubber boot, blue
HI 710024	Shockproof rubber boot, orange
HI 765-18C	Test key at -18.0°C
HI 765000C	Test key at 0.0°C
HI 765070C	Test key at +70.0°C

A wide variety of probes are available, see the end of this Thermistor Thermometer Section.

HI 93501N • HI 93501NS

Thermistor Thermometers

- **High accuracy ±0.4°C**
- **Compact, heavy-duty, and waterproof**
- **Calibration Check™ at startup**
- **Missing/damaged probe indicators**
- **Stability indicator (HI 93501NS)**
- **HOLD button (HI 93501NS)**
- **BEPS and low battery warning**
- **Battery level indicator at startup**
- **Easy to clean and keep clean**

HI 93501N is a waterproof thermometer designed for daily use in food applications such as industrial kitchens and catering. The "S" version also adds a stability indicator bargraph and HOLD button to freeze readings on the LCD.

The HI 762PWL penetration probe is included. A diverse assortment of HI 762 probes and cable lengths are available. Probes can be ordered with different handle colors to prevent cross-contamination.

The display indicates the remaining battery power at startup then continuously checks the battery level and warns the user with ample time to change the battery.

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.

Users can check the meter's accuracy at any time with HANNA calibration keys. Simply plug the key into the meters probe input and if the display value does not match those of the key, the meter is due for recalibration.

ORDERING INFORMATION

HI 93501N and **HI 93501NS** are supplied with HI 762PWL temperature probe, batteries, instructions and rugged carrying case.

PROBES

HI 762DIP	Weighted, stainless steel thermistor temperature probe with 1 m (3.3') cable for measurement in tanks
HI 762A	Air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 762L	Air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 762W	Thermistor, stainless steel wire temperature probe with 1 m cable

ACCESSORIES

HI 710023	Shockproof rubber boot, blue
HI 710024	Shockproof rubber boot, orange
HI 762-18C	Test key at -18.0°C
HI 762000C	Test key at 0.0°C
HI 762070C	Test key at +70.0°C

SPECIFICATIONS	HI 93501N • HI 93501NS
Range	-50.0 to 150.0°C
Resolution	0.1°C
Accuracy	±0.4°C for 1 year, excluding probe error
Probe	HI 762PWL penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable (included)
Battery Type / Life	1.5V AAA (3) / approximately 2000 hours of continuous use; auto-off after 8 minutes of non-use
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")
Weight	205 g (7.2 oz.)

A wide variety of probes are available, see the end of this Thermistor Thermometer Section.

HI 93503

Waterproof Thermometer with Pre-Calibrated Interchangeable Probe

- **High accuracy ±0.4°C**
- **Compact, heavy-duty, and waterproof**
- **Calibration Check™ at startup**
- **Stability indicator**
- **HOLD button**
- **BEPS and low battery warning**
- **Battery level indicator at startup**

HI 93503 features a new streamlined design with bottom probe connection. This instrument measures a wide range of from -50.0°C to 150.0°C with exceptional accuracy. This meter is simple to operate and supplied with the user replaceable HI 765PWL penetration probe.

The HI 93503 also features a HOLD button to freeze the display to allow the user time to record readings and a stability indicator.

Exchange the probe with any other model in the HI 765 series without requiring recalibration. A diverse assortment of HI 765 probes and cable lengths are available. Probes can be ordered with different handle colors to prevent cross-contamination.

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

Users can check the meter's accuracy at any time with HANNA calibration keys. Simply plug the key into the meters probe input and if the display value does not match those of the key, the meter is due for recalibration.

SPECIFICATIONS	HI 93503
Range	-50.0 to 150.0°C
Resolution	0.1°C
Accuracy	±0.4°C, excluding probe error
Probe	HI 765PWL penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable (included)
Battery Type / Life	1.5V AAA (3) /approximately 2000 hours of continuous use. auto-off after 8 minutes of inactivity
Environment	-10 to 50°C (14 to 122°F); RH max 100%
Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")
Weight	205 g (7.2 oz.)

ORDERING INFORMATION

HI 93503 is supplied with HI 765PWL temperature probe, batteries, instructions and hard carrying case.

PROBES

HI 765PW	General purpose/penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765A	Air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765L	Air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 765W	Thermistor wire, stainless steel temperature probe with 1 m cable

ACCESSORIES

HI 710023	Shockproof rubber boot, blue
HI 710024	Shockproof rubber boot, orange
HI 765-18C	Test key at -18.0°C
HI 765000C	Test key at 0.0°C
HI 765070C	Test key at +70.0°C

A wide variety of probes are available, see the end of this Thermistor Thermometer Section.

HI 93510 • HI 93510N

Thermistor Thermometers

- **Waterproof casing**
- **High accuracy ±0.4°C/±0.8°F**
- **Switch between °C and °F at the touch of a button**
- **HOLD button**
- **BEPS and low battery warning**
- **Battery level indicator at startup**
- **2000 hour battery life**
- **Backlit display (N version)**
- **Calibration feature (N version)**

HI 93510 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 HI 93510N offers all the features of the HI 93510 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, HI 93510N has a user-activated backlit display.

A diverse assortment of HI 762 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.

HI 762 Test Keys

ORDERING INFORMATION

HI 93510 and **HI 93510N** are supplied with HI 762BL temperature probe, batteries and instructions.

PROBES

HI 762L	Air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
HI 762A	Air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 762-18C	Test key at -18.0°C
HI 762000C	Test key at 0.0°C
HI 762070C	Test key at 70.0°C

SPECIFICATIONS	HI 93510	HI 93510N
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	HI 762BL 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); HI 93510 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.)	

A wide variety of probes are available, see the end of this Thermistor Thermometer Section.

HANNA instruments

With Great Products, Come Great Results™

2-channel Thermistor Thermometers

HI 762 Test Keys

- **Two input channels**
- **Waterproof casing**
- **High accuracy ± 0.4°C/± 0.8°F**
- **HOLD button**
- **BEPS and low battery warning**
- **2000 hour battery life**
- **Backlit display (HI 93522)**
- **Calibration feature (HI 93522)**
- **Reading store and recall**

HI 93512 is a waterproof two-channel thermometer, ideal for monitoring two samples at once. This easy to use thermometer displays the temperature together with high and low readings.

HI 93512 allows the user to view the differences between each channel (along with the high and low values or current temperature at each probe), as well as the variance from a reference temperature.

For even greater accuracy, the HI 93522 incorporates a CAL button that allows the operator to remove the combined meter and probe interchange error in an ice bath at 0°C. HI 93522 can also store and recall a reading as well as allowing the user to set the auto-off time period and activate the backlight for low light conditions.

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

A diverse assortment of HI 762 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	HI 93512	HI 93522
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	HI 762BL 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); HI 93522 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

HI 93512 and **HI 93522** are supplied with HI 762BL temperature probe, batteries and instructions.

PROBES

HI 762L	Air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable

ACCESSORIES

HI 762-18C	Test key at -18.0°C
HI 762000C	Test key at 0.0°C
HI 762070C	Test key at 70.0°C
HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange

A wide variety of probes are available, see the end of this Thermistor Thermometer Section.

HI 762

HI 762 Thermistor Probes

The HI 762 temperature probes can be identified by the grey cap on the top of the handle and have the following specifications:

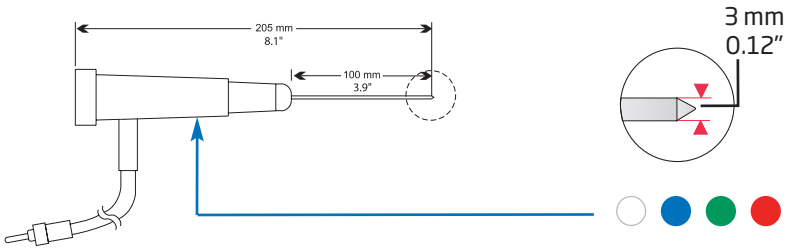
Range	-50 to 150°C (-58 to 302°F)
Sensor	NTC thermistor
Accuracy	±0.2°C (±0.4°F)
Probe Handle	ABS
Interchange Error	±0.2°C (±0.4°F)
Probe	AISI 316 stainless steel
Response Time (90% of final value)	6 seconds

The HI 762 series with NTC thermistor sensor offers a wide range of probes for measuring liquids, air and gases, and for penetration in semisolids.

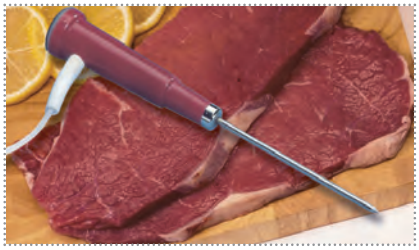
Models are available with a 1, 2 or 10 meter cable, and colored handles to be identified more easily when measuring different samples.

HI 762P

General purpose, penetration probe with colored handle.

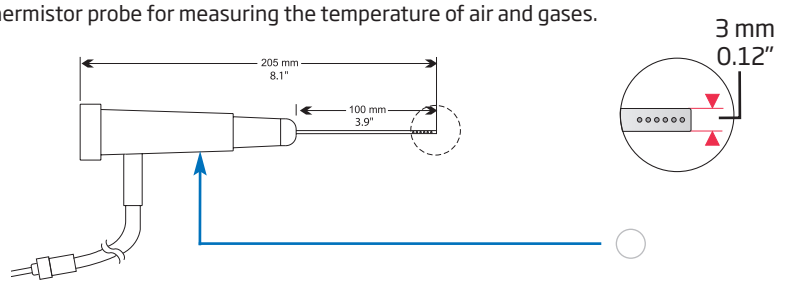


SPECIFICATIONS			
1 m (3.3') Cable	**2 m (6.6') Cable**	**10 m (32.8') Cable**	**Handle Color**
HI 762PW	–	HI 762PW/10	white
HI 762PBL	–	HI 762PBL/10	blue
HI 762PG	–	HI 762PG/10	green
HI 762PR	–	HI 762PR/10	red



HI 762A

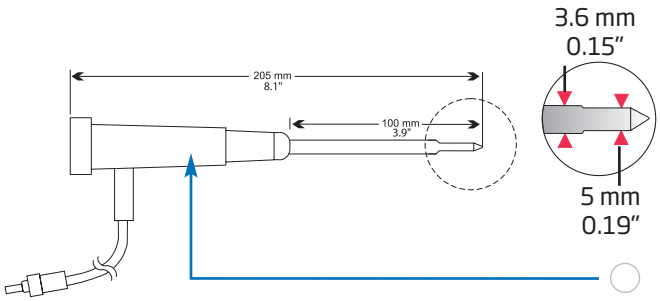
Thermistor probe for measuring the temperature of air and gases.



SPECIFICATIONS			
1 m (3.3') Cable	**2 m (6.6') Cable**	**10 m (32.8') Cable**	**Handle Color**
HI 762A	–	HI 762A/10	white

HI 762PWL

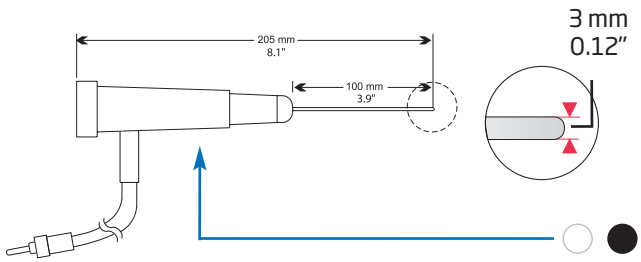
Thermistor probe with sharp tip for penetration of semi-solid samples.



SPECIFICATIONS			
1 m (3.3') Cable	**2 m (6.6') Cable**	**10 m (32.8') Cable**	**Handle Color**
HI 762PWL	–	–	white

HI 762L

Air, liquid probe.

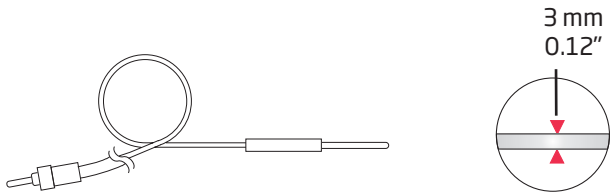


SPECIFICATIONS			
1 m (3.3') Cable	**2 m (6.6') Cable**	**10 m (32.8') Cable**	**Handle Color**
HI 762L	HI 762L/2	HI 762L/10	white
HI 762BL	–	–	black

HI 762W

Wire probe, designed to access hard to reach places.

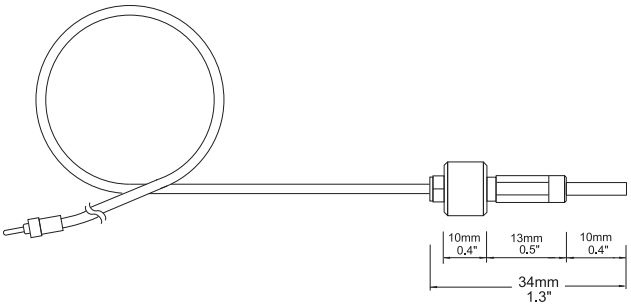
Probe does not incorporate a handle.



SPECIFICATIONS			
1 m (3.3') Cable	**2 m (6.6') Cable**	**10 m (32.8') Cable**	**Handle Color**
HI 762W	–	HI 762W/10	–

HI 762DIP

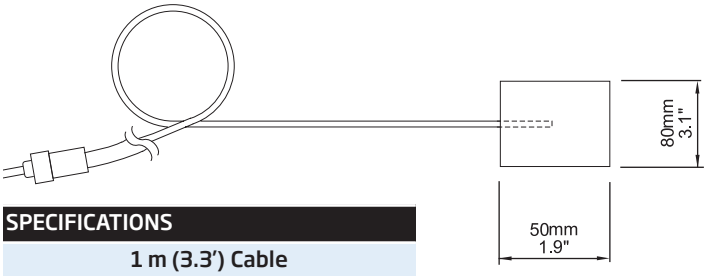
Weighted probe without handle, designed to measure the temperature in tanks.



SPECIFICATIONS			
1 m (3.3') Cable	2 m (6.6') Cable	10 m (32.8') Cable	Handle Color
HI 762DIP	HI 762DIP/5	HI 762DIP/50	white

HI 762BP

Thermistor probe without handle, designed to measure the temperature of stacked goods.



SPECIFICATIONS
1 m (3.3') Cable
HI 762BP

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 HI 762 Probes

HI 762-18C	Test key at -18°C	**HI 762-004F**	Test key at -0.4°F
HI 762000C	Test key at 0°C	**HI 762032F**	Test key at 32°F
HI 762070C	Test key at 70°C	**HI 762158F**	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.

HI 765 Thermistor Probes

The HI 765 temperature probes are provided with a PTC thermistor sensor, and have the following specifications:

Range	-50 to 150°C (-58 to 302°F)
Accuracy	±0.2°C (±0.4°F)
Sensor	PTC thermistor
Probe Handle	ABS
Interchange Error	±0.2°C (±0.4°F)
Probe	AISI 316 stainless steel
Response Time (90% of final value)	8 seconds

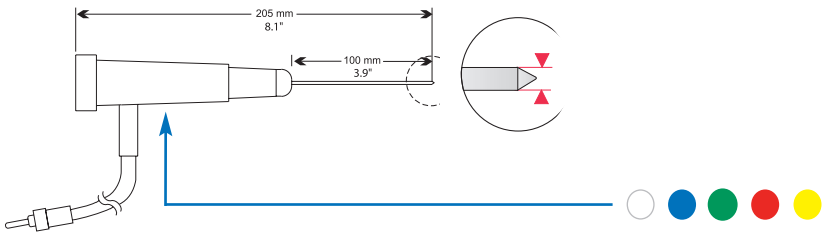
All probes are pre-calibrated with a maximum error of ±0.2°C (±0.4°F).

The HI 765 series can be identified by the white cap on the top of the handle. This series offers a wide range of probes for measuring liquids, air and gases, and for penetration in semi-solids.

Models are available with a cable length of 1 to 10 meters and colored handles for easy identification during measurements of different samples.

HI 765P

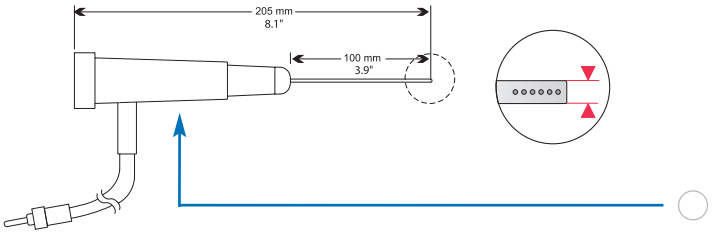
General purpose, penetration probe with colored handle.



SPECIFICATIONS		
1 m (3.3') Cable	**10 m (32.8') Cable**	**Handle Color**
HI 765PW	HI 765PW/10	white
HI 765PWD (DIN connector)	–	white
HI 765PWST (braided cable)	–	white
HI 765RP	–	white
HI 765PBL	HI 765PBL/10	blue
HI 765PG	HI 765PG/10	green
HI 765PR	HI 765PR/10	red
HI 765PY	–	yellow

HI 765A

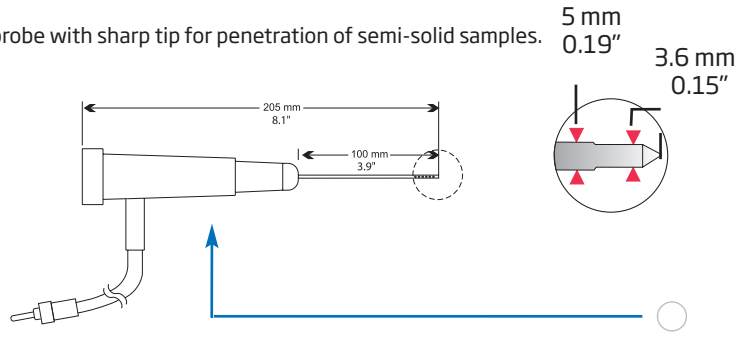
Thermistor probe for measuring the temperature of air and gases.



SPECIFICATIONS		
1 m (3.3') Cable	**10 m (32.8') Cable**	**Handle Color**
HI 765A	HI 765A/10	white

HI 765PWL

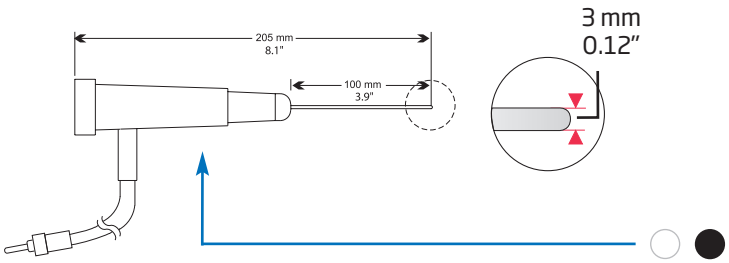
Thermistor probe with sharp tip for penetration of semi-solid samples.



SPECIFICATIONS		
1 m (3.3') Cable	**2 m (6.6') Cable**	**Handle Color**
HI 765PWL	HI 765PWL/2	white

HI 765L

Air, liquid probe.

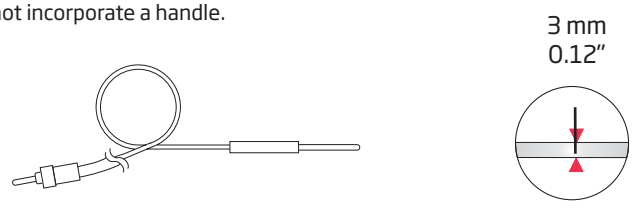


SPECIFICATIONS		
1 m (3.3') Cable	**10 m (32.8') Cable**	**Handle Color**
HI 765L	HI 765L/10	white
HI 765BL	–	black

HI 765W

Wire probe, designed to access hard to reach places.

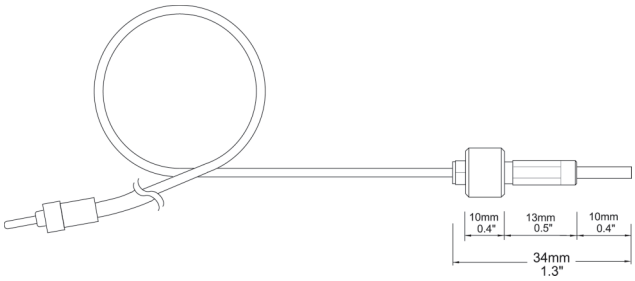
Probe does not incorporate a handle.



SPECIFICATIONS	
1 m (3.3') Cable	**10 m (32.8') Cable**
HI 765W1	HI 765W/10

HI 765DIP

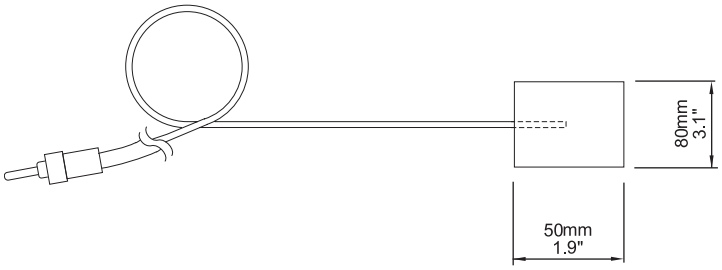
Weighted probe without handle, designed to measure the temperature in tanks.



SPECIFICATIONS			
1 m (3.3') Cable	**3 m (9.9') Cable**	**5 m (16.4') Cable**	**10 m (32.8) Cable**
HI 765DIP	HI 765DIP/3	HI 765DIP/5	HI 765DIP/10

HI 765BP

Thermistor probe without handle, designed to measure the temperature of stacked goods.



SPECIFICATIONS	
1 m (3.3') Cable	**2 m (6.6') Cable**
HI 765BP1	HI 765BP2

HI 765S

Surface probe for FoodCare thermometers.

SPECIFICATIONS
1 m (3.3') Cable
HI 765S

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 HI 765 Probes

HI 765-18C	Test key at -18°C	**HI 765-004F**	Test key at -0.4°F
HI 765000C	Test key at 0°C	**HI 765032F**	Test key at 32°F
HI 765070C	Test key at 70°C	**HI 765158F**	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.

HI 955501 • HI 955502

4-wire Pt100 Thermometers

- **Autoranging**
- **Available with interchangeable or fixed probe**
- **Economical**
- **Missing probe indictor (HI 955501)**
- **Optional protective boot**

Pt100 models are widely recognized as the most accurate with the best stability, repeatability and linearity among thermometers. Add to this the 4-wire system that is practically impervious to lead-wire length error and you have a powerful tool to measure temperature accurately.

HI 955501 works with HI 768 series of Pt100 temperature probes, while the HI 955502 model is supplied with fixed general-purpose probe.

HI 955501 also features a missing probe indicator to alert the user if no temperture probe is detected.

Both the HI 955501 and HI 955502 measure temperatures with 0.1°C resolution in the -199.9 to 199.9°C range and then automatically switch to 1°C from 200 to 850°C. Press RANGE and the resolution switches to 1°C at any time.

A compact, ergonomic design and a wrist-strap make it easy to carry them anywhere in the lab or plant. To protect the meter during field measurements, a HANNA shockproof boot is recommended.

Shown with optional HI 710007 protective rubber boot

ORDERING INFORMATION

HI 955501 is supplied with battery and instructions.
HI 955502 is supplied with HI 768P fixed temperature probe, battery and instructions.

PROBES

HI 768A	Air/gas, stainless steel Pt100 temperature probe (fixed) with 1 m (3.3') cable
HI 768L	Air/liquid, stainless steel Pt100 temperature probe (fixed) with 1 m (3.3') cable
HI 768P	General purpose/penetration, Pt100 stainless steel temperature probe with 1 m (3.3') cable

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 710004	Soft carrying case

SPECIFICATIONS	HI 955501	HI 955502
Range	-199.9 to 199.9°C; 200 to 850°C	
Resolution	0.1°C (-199.9 to +199.9°C); 1°C (-200 to 850°C)	
Accuracy	±0.2°C and ±1 digit (-120.0 to 199.9°C); ±1°C and ±1 digit (-170 to 450°C); ±1% f.s. and ±1 digit (outside) (for 1 year, excluding probe error)	
Probe	HI 768 series stainless steel Pt100 temperature probe with 1 m (3.3') cable (not included)	HI 768P general purpose/penetration, stainless steel Pt100 temperature probe (fixed) with 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 150 hours of continuous use	
Environment	0 to 50°C (32 to 122°F); RH max 95%	
Dimensions	143 x 80 x 38 mm (5.6 x 3.2 x 1.5")	
Weight	320 g (11.3 oz.)	

A variety of probes are available with different cable lengths, see the next page.

HANNA instruments

With Great Products, Come Great Results™

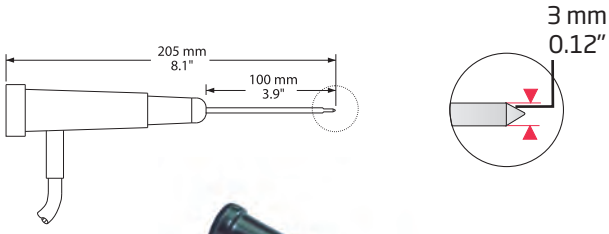
HI 768 Series: Pt100 Probes

The HI 768 series of temperature probes is provided with a Pt100 sensor and features the following specifications:

Range	-30 to 350°C (-22 to 622°F)
Sensor	Pt100
Accuracy	±0.25°C (±0.5°F) ±3% of reading
Probe Handle	Carilon®
Interchange Error	±0.2°C (±0.4°F)
Probe	AISI 316 stainless steel
Response Time	30 seconds

HI 768P, General Purpose/Penetration Probe

Pt100 probe for applications, such as air measurement and penetration of semi-solids.

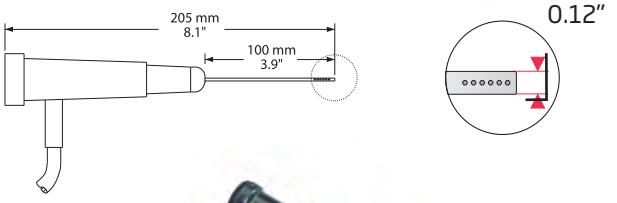


SPECIFICATIONS

CODE	APPLICATION	PROBE DIMENSIONS	HANDLE COLOR	CABLE LENGTH
HI 768P	general purpose/penetration	L 205 mm x dia 3 mm (0.12")	green	1 m (3.3')
HI 768PBL/10	general purpose/penetration	L 205 mm x dia 3 mm (0.12")	blue	10 m (32.8')

HI 768A

Pt100 probe for measuring the temperature of air and gases.

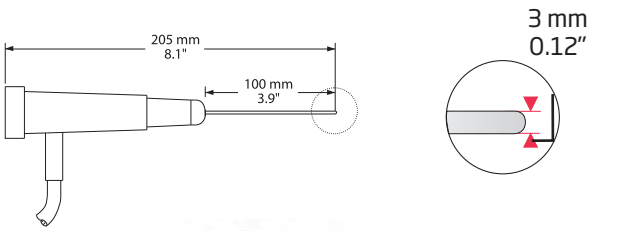


SPECIFICATIONS

CODE	APPLICATION	PROBE DIMENSIONS	CABLE LENGTH
HI 768A	air, gases	L 205 mm x dia 3 mm (0.12")	1 m (3.3')
HI 768A/3	air, gases	L 205 mm x dia 3 mm (0.12")	3 m (9.9')
HI 768A/5	air, gases	L 205 mm x dia 3 mm (0.12")	5 m (16.4')

HI 768L

Pt100 probe for applications, such as liquid and air.



SPECIFICATIONS

CODE	APPLICATION	PROBE DIMENSIONS	CABLE LENGTH
HI 768L	liquid, air	L 205 mm x dia 3 mm (0.12")	1 m (3.3')
HI 768L/3	liquid, air	L 205 mm x dia 3 mm (0.12")	3 m (9.9')
HI 768L/5	liquid, air	L 205 mm x dia 3 mm (0.12")	5 m (16.4')

HI 99551 • HI 99556

Infrared Thermometers for the Food Industry

- **Non-invasive measurement**
- **HOLD function**
- **Battery life indicator on startup**
- **Optional external probe can also be used (HI 99556)**

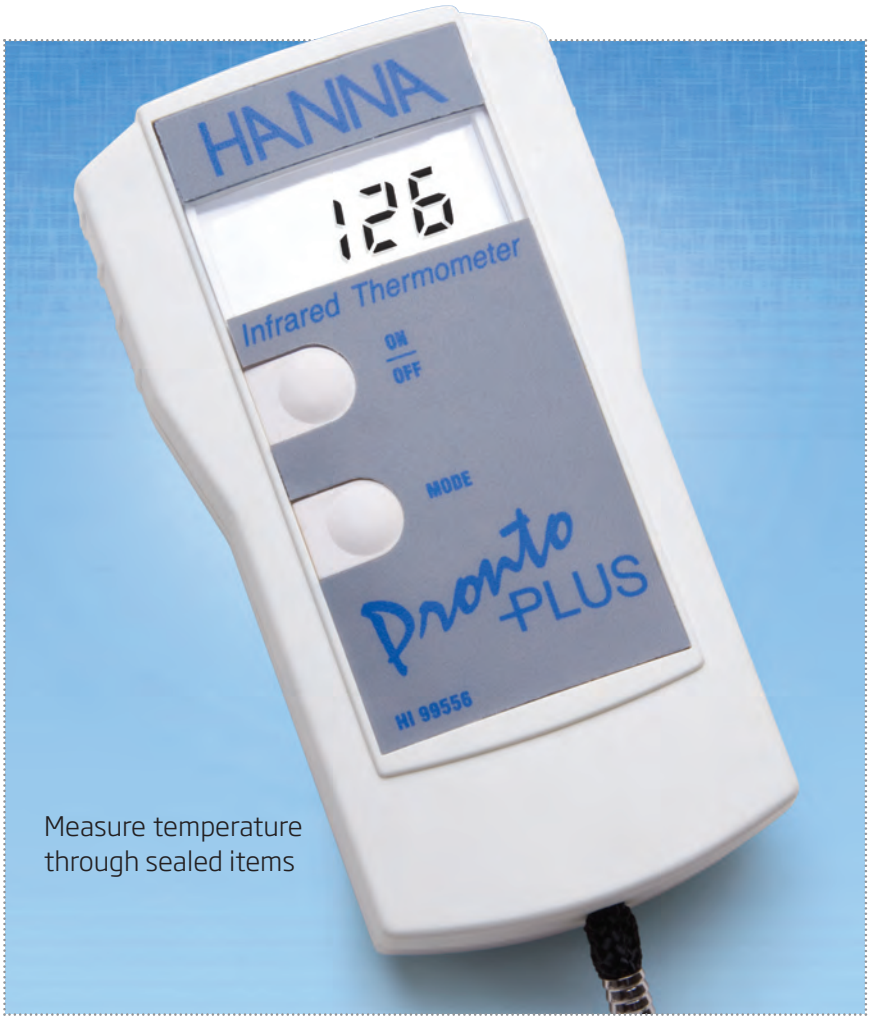
The HI 99551 and HI 99556 thermometers employ infrared technology to measure surface temperatures. Infrared readings are extremely fast with a response time typically around 1 second.

One big advantage of these meters is the non-intrusive nature of measurements. This feature is particularly attractive for food distribution, retailing and markets since it translates practicality into savings by leaving products intact, especially those sealed or pre-wrapped.

In order to measure the temperature, simply turn on the meter and point to the product or target. Readings are displayed on the LCD. This type of non-intrusive measurement is also useful when the surface temperature is too high to approach, for difficult to reach places or for hygiene requirements.

If you must check the core temperature in addition to surface measurement, the HI 99556 is the ideal solution for you. Simply attach an optional external probe to the meter and you have a 2-in-1 infrared-thermistor thermometer.

A HOLD function freezes the display to allow the user time to record readings.



Measure temperature through sealed items

ORDERING INFORMATION

Choose your configuration:

x = **1** meter with IR sensor
6 meter with IR sensor and HI 765PW probe (40 to 150°C range)

y = **00** IR range from -10 to 300°C
01 IR range from 14 to 572°F
10 IR range from -20 to 199.9°C

HI 9955 [x] – [y]

PROBES

HI 765PW General purpose/penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable

ACCESSORIES

HI 731318 Sensor cleaning cloth (4)
HI 710007 Shockproof rubber boot, blue
HI 710008 Shockproof rubber boot, orange
HI 710004 Soft carrying case
HI 721316 Rugged carrying case

SPECIFICATIONS		HI 99551-00/ HI 99556-00	HI 99551-01/ HI 99556-01	HI 99551-10/ HI 99556-10
Range	IR	-10 to 300°C	14 to 572°F	-20.0 to 199.9°C
	Probe (HI 99556 only)	-40 to 150°C	-40 to 302°F	-40 to 150.0°C
Resolution	IR	1°C	1°F	0.1°C
	Probe (HI 99556 only)	1°C	1°F	0.1°C
Accuracy	IR	±2% of reading or ±2°C	±2% of reading or ±3°F	±2% of reading or ±2°C
	Probe (HI 99556 only)	±0.5°C (-20 to 120°C); ±0.5°C +1% reading (outside)	±1°F (0 to 250°F); ±1°F +1% reading (outside)	±0.5°C (-20 to 120°C); ±0.5°C +1% reading (outside)
IR Sensor Response Time		1 second		
IR Sensor Optic Coefficient		3:1 (ratio of distance to target diameter)		
Minimum Distance		30 mm (1.2")		
Probe (HI 99556 only)		HI 765PW general purpose/penetration, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable (included)		
Battery Type / Life		9V / approximately 150 hours of continuous use		
Environment		0 to 50°C (32 to 122°F); RH max 95%		
Dimensions		143 x 80 x 38 mm (5.6 x 3.2 x 1.5")		
Weight		320 g (11.3 oz.)		

HANNA instruments

With Great Products, Come Great Results™

Infrared Thermometers

- **Measure temperature in difficult to reach places**
- **HOLD function**
- **Battery life indicator on startup**
- **Ideal for industrial facilities**

Infrared radiation emitted from an object depends on its temperature. The HANNA HI 99550 infrared thermometer employs this technology to measure surface temperature. Infrared thermometers provide non-invasive measurements with instantaneous response times. This can translate into substantial savings particularly in industries where products are sealed or pre-wrapped.

In order to measure the temperature, simply point to the product or the target spot and hold down the measurement key. The measured value will be immediately displayed on the LCD.

This type of non-intrusive measurement is also useful when the surface temperature is high, for difficult to reach places or due to hygiene requirements.

HANNA HI 99550 is designed with a wrist-strap and ergonomic shape for greater ease of use.

The fast response time along with the HOLD function, which freezes the display to allow the user time to record readings, make the HI 99550 infrared thermometer particularly attractive for repetitive tests in the factory or on the production line.

SPECIFICATIONS	HI 99550-00	HI 99550-01
Range	-10 to 300°C	14 to 572°F
Resolution	1°C	1°F
Accuracy	±2% of reading or ±2°C	±2% of reading or ±3°F
Emissivity	0.95	
Typical Response Time	1 second	
Optic Coefficient	3:1 (ratio of distance to target diameter); minimum distance 30 mm (1.2")	
Battery Type / Life	9V / approximately 150 hours of continuous use	
Environment	0 to 50°C (32 to 122°F); RH max 95%	
Dimensions	143 x 80 x 38 mm (5.6 x 3.2 x 1.5")	
Weight	320 g (11.3 oz.)	

ORDERING INFORMATION

HI 99550-00 and **HI 99550-01** are supplied with battery and instructions.

ACCESSORIES

HI 731318	Sensor cleaning cloth (4)
HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 710004	Soft carrying case
HI 721316	Rugged carrying case

HI 141

Temperature Dataloggers

- 1 or 2 channels with internal or external sensor
- With or without LCD
- 16,000 samples/channel (1-channel models) or 8,000 samples/channel (2-channel models)
- Logging interval from 1 second to 24 hours
- Logging delay start up to 199 hours and magnetic start
- Programmable high and low alarms
- Non-volatile storage of logging
- Waterproof casing
- BEPS (Battery Error Protection System)

The HI 141 series is a family of temperature dataloggers with either one or two channels, internal or external temperature sensors, and an optional LCD. External temperature sensor models feature one or two stainless steel sensors on a 1 m (3.3') cable for direct insertion. HI 141 can store up to 16,000 temperature samples in a protected, non-volatile EEPROM memory. The logging interval can be set from once per second to once per 24 hour period, and logging delay can be set anywhere up to 199 hours. The MIN or MAX temperature between logging intervals can also be stored. All of your collected data is tamper-proof and stored into serial numbered lots.

The HI 141000 Windows® compatible software supports communication between the logger and the PC through the HI 141001 infrared transmitter.

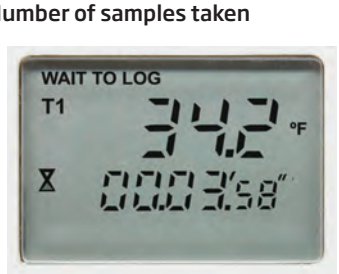
The waterproof housing can include a convenient hanging hook (simply add an "H" to the end of the code). For a typical 1 minute logging interval, the battery will last about 4 years.

Users can assess the current temperature, channel and status of the logging sequence according to your programmed instructions:

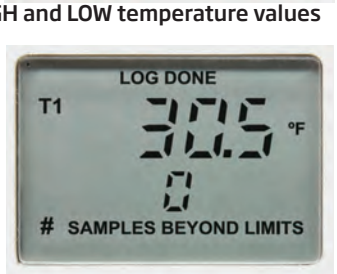
HIGH and LOW alarm settings

Number of samples taken

HIGH and LOW temperature values



Countdown until the start of logging



Number of samples which have exceeded the HIGH/LOW alarms

HANNA instruments

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SPECIFICATIONS Model	Display	Molded Eye for Hanging	Sensor(s)	Cable Length (if applicable)	Range
HI 141A			1 internal	–	-40.0 to 80.0°C / -40.0 to 176.0°F
HI 141AH		•	1 internal	–	-40.0 to 80.0°C / -40.0 to 176.0°F
HI 141B			1 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH		•	1 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH/3		•	1 external	3 m (9.8')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH/10		•	1 external	10 m (32.8')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH/15		•	1 external	15 m (49.2')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH/20		•	1 external	20 m (65.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141BH/25		•	1 external	25 m (82')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141C	•		1 internal	–	-20.0 to 70.0°C / -40.0 to 158.0°F
HI 141CH	•	•	1 internal	–	-20.0 to 70.0°C / -40.0 to 158.0°F
HI 141D	•		1 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DH	•	•	1 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DH/2	•	•	1 external	2 m (6.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DH/5	•	•	1 external	5 m (16.4)	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DHS/5	•	•	1 external, 12 cm penetration	5 m (16.4)	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DH/10	•	•	1 external	20 m (65.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141DH/20	•	•	1 external	20 m (65.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141E			1 internal 1 external	1 m (3.3')	-40.0 to 80.0°C / -40.0 to 176.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141EH		•	1 internal 1 external	1 m (3.3')	-40.0 to 80.0°C / -40.0 to 176.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141EH/2		•	1 internal 1 external	2 m (6.6')	-40.0 to 80.0°C / -40.0 to 176.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141F			2 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141FH		•	2 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141G	•		1 internal 1 external	1 m (3.3')	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141GH	•	•	1 internal 1 external	1 m (3.3')	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141GHS/120	•	•	1 internal 1 external, 12 cm penetration	1 m (3.3')	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141GH/2	•	•	1 internal 1 external	2 m (6.6')	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141GH/5	•	•	1 internal 1 external	5 m (16.4)	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141GH/20	•	•	1 internal 1 external	20 m (65.6')	-20.0 to 70.0°C / -40.0 to 158.0°F -40.0 to 125.0°C / -40.0 to 257.0°F
HI 141J	•		2 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JH	•	•	2 external	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JHS/120	•	•	2 external, 12 cm penetration	1 m (3.3')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JH/2	•	•	2 external	2 m (6.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JHS/2	•	•	2 external, 12 cm penetration	2 m (6.6')	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JH/5	•	•	2 external	5 m (16.4)	-40.0 to 125.0°C / -40.0 to 257.0°F
HI 141JH/15	•	•	2 external	15 m (49.2')	-40.0 to 125.0°C / -40.0 to 257.0°F

Specification for all models

Resolution	0.1°C (-40.0 to 100.0°C); 0.2°C (> 100.0°C) 0.1°F (-40.0 to 190.0°F); 0.3°F (> 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)
Environment	RH 100%
Diameter	86.5 mm (3.4")
Height	35 mm (1.4")
Weight	150 g (5.5 oz.)

* For models with molded hook, use the "H" at the end of the part code. Ex. HI 141AH
** Models with different cable lengths are available upon request. Contact your nearest HANNA dealer.

ORDERING INFORMATION

All **HI 141** models are supplied with 3.6V Lithium AA battery, magnetic key and instructions.

ACCESSORIES

HI 141000	Windows® application software (Required)
HI 141001	Infrared transmitter (Required)
HI 740033	3.6 V AA lithium battery
HI 740221	Key for HI 141 magnetic start

HI 140

Temperature Dataloggers

- **LED indicators**
- **Store up to 7600 temperatures**
- **Remotely controlled form the PC**
- **BEPS** (Battery Error Protection System)

HI 140 loggers are not much larger than a PC mouse. They are housed in a smooth, yet tough ABS casing that is sealed against ingress of dust and water.

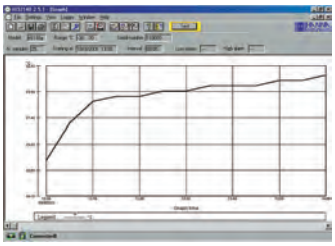
These dataloggers represent the most economical and secure way of monitoring temperature continuously over long periods of time. They can be placed with goods on the move, on supermarket shelves and in warehouses. They record the temperature at a given interval to make sure that perishable goods are not left unattended such as on a loading dock on the other side of the world! For instance, users can check if fresh fish remained at unacceptable temperatures and for how long! They can provide that extra guarantee that goods never ventured out of limits of public safety.

HI 140 models feature different temperature ranges to make them more accurate for your specific needs. A green LED on the front of the meter notifies users of the logging status, while a red LED serves as an alarm indication when undesired temperatures have been encountered.

HI 140 can store up to 7600 measurements at selectable intervals from 1 minute to 24 hours. All parameters can be set through our Windows® compatible software. An infrared cradle eliminates the need to put a connector on the meter - an undesirable dirt-trap in the food market and source of problems due to wear and tear over time.

Logged data can be transferred to a PC by simply placing the instrument on the HI 90140 interface and running the HI 92140 software. Users need just one interface connected to the PC to handle all HANNA dataloggers, each identified by a unique ID code.

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.



- **The HI 140 logger is an excellent way to conform with HACCP requirements and guarantee safety throughout the food chain**
- **Through HI 92140 application software (optional), all models can be programmed to read °C or °F**
- **Completely user friendly - set the parameters to best fit your application**

ORDERING INFORMATION

All **HI 140** models are supplied with batteries and instructions.

ACCESSORIES

HI 90140	Infrared interface for PC connection
HI 92140	Windows® compatible software

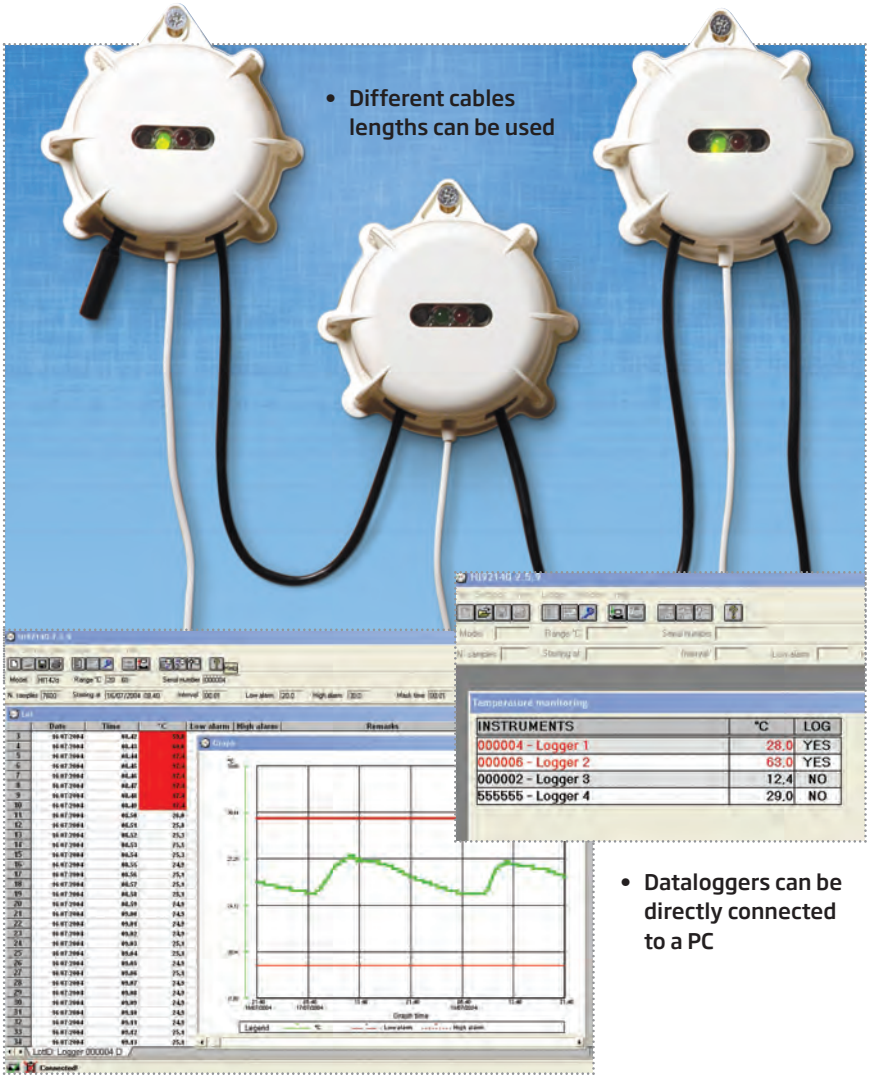
SPECIFICATIONS

Model	Range	Resolution	Accuracy
HI 140A(H)*	-30.0 to 70.0°C / -22.0 to 158.0°F	0.5°C / 0.5°F	±1.5°C / ±3°F
HI 140B(H)	-10.0 to 30.0°C / 14 to 86°F	0.2°C / 0.4°F	±0.5°C / ±1°F
HI 140C(H)	-30.0 to 10.0°C / -22 to 50°F	0.2°C / 0.4°F	±0.5°C / ±1°F
HI 140D(H)	20.0 to 60.0°C / 68 to 140°F	0.2°C / 0.4°F	±0.5°C / ±1°F
HI 140E(H)	-30.0 to -10.0°C / -22 to 14°F	0.1°C / 0.2°F	±0.3°C / ±0.6°F
HI 140F(H)	20.0 to 40.0°C / 68 to 104°F	0.1°C / 0.2°F	±0.3°C / ±0.6°F
HI 140G(H)	-5.0 to 15.0°C / 23 to 59°F	0.1°C / 0.2°F	±0.3°C / ±0.6°F
HI 140H(H)	10 to 120°C / 50 to 248°F	1°C /.2°F	±2°C / ±4°F

All loggers have the following features: programmable high and low alarm thresholds; programmable logging interval from 1 min. to 23 hours and 59 min; logging delay start selectable from 0 min. to 23 hours and 59 min; programmable ID number; infrared communication with PC interface; programmable real time clock; 3 x 1.5V AA batteries (included) with approx. life of 4 years at 25°C; dimensions: dia 86.5 mm x h 35 mm; / weight: 150 g

* For models with molded hook, use the "H" at the end of the part code. Ex. HI 140AH

Temperature Monitoring System



• **Dataloggers can be directly connected to a PC**

- **Monitor temperature from a PC**
- **Create a network of up to 31 loggers**

Required temperature monitoring and control is becoming more prevalent in the food industry, catering and supermarkets.

Many instruments have been produced for continuous temperature monitoring, but they usually have to be removed from their location for data transfer.

Now, with our HI 142, this is no longer a problem. HI 142 is available in 8 models with different temperature ranges and can log up to 7600 samples.

Users can interact with the loggers directly from a PC and check the status of the instruments. From the PC software, users can also can perform set-up as well as download data when logging is complete. It is possible to build a network with up to 31 loggers.

HI 92140 Windows® compatible software can be also used to set High and Low alarm thresholds, logging interval, logging delay start, alarm mask time, and lot ID.

SPECIFICATIONS Model	Range	Resolution	Accuracy
HI 142A(H)*	-30.0 to 70.0°C	0.5°C	±1.5°C
HI 142B(H)(/5)**	-10.0 to 30.0°C	0.2°C	±0.5°C
HI 142C(H)	-30.0 to 10.0°C	0.2°C	±0.5°C
HI 142D(H)	20.0 to 60.0°C	0.2°C	±0.5°C
HI 142E(H)	-30.0 to -10.0°C	0.1°C	±0.3°C
HI 142F(H)	20.0 to 40.0°C	0.1°C	±0.3°C
HI 142G(H)	-5.0 to 15.0°C	0.1°C	±0.3°C
HI 142H(H)(/5)	10 to 120°C	1°C	±2°C

Specifications for all models	
Data Logging	up to 7600 samples
Environment	0 to 50°C (32 to 122°F); RH max 95%
Power Supply	10-20 VDC
Probe	fixed, with 1.5 m cable of non-toxic material
Dimensions / Weight	dia 86.5 x h 35 mm (dia 3.4 x h 1.4") / 150 g (5.5 oz.)

* For models with molded hook, use the "H" at the end of the part code. Ex. HI 142AH
** For models with a 5 m (16.4') cable, use the "/5" at the end of the part code. Ex. HI 142HH/5

ORDERING INFORMATION

HI 142 is supplied with instructions.

ACCESSORIES

HI 92140 Windows® compatible software

HI 143

T-Logger with Locking Wall Cradle

- **Logging start through PC** by pressing a button or at a set time
- **Selectable sampling interval** from 1 minute to 24 hours
- **Up to 4,000 logged samples**
- **Selectable measurement unit, °C or °F**
- **Min/Max measured values are stored and displayed**
- **Programmable high and low alarms**
- **Non-volatile storage of logging parameters and data**
- **Battery level indicator on display**
- **Security password**
- **Waterproof protection**

HI 143 is a temperature data logger with internal NTC sensor. The HI 143 is controlled via USB or RS232 on a PC with HANNA's Windows® compatible application software. Communication is made between the logger and the PC through the HI 143001 transmitter with RS232 or HI 143002 with USB connector. The supplied wall cradle makes it easy to lock the meter in place to prevent tampering and the application software supports security passwords.

ORDERING INFORMATION

HI 143 is supplied with CR2032 lithium battery, wall cradle, lock and instructions.

HI 143-00 is supplied with HI 143001 RS232 communication cradle, Windows® compatible application software, CR2032 lithium battery, wall cradle, lock and instructions.

HI 143-10 is supplied with HI 143002 USB communication cradle, Windows® compatible application software, CR2032 lithium battery, wall cradle, lock and instructions.

ACCESSORIES

HI 143002	USB communication cradle
HI 143001	RS232 communication cradle
HI 92143	HI 143 software

SPECIFICATIONS	HI 143
Range	-30. 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 4,000 samples
Logging Interval	user selectable, from 1 minute to 24 hours
Battery Type / Life	CR2032 3V lithium ion / approximately 2 years
Protection	IP65 (water-resistant)
Dimensions	60 x 37 x 17 mm (2.4 x 1.5 x 0.7")

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