

# Combination pH and ORP Electrodes

pH and ORP Electrodes Designed and Manufactured by HANNA

**HI 104XY** CONNECTOR

**HI 1043B** BNC

**HI 1040S** Screw Cap

**HI 1043P** BNC + PIN\*

**HI 105XY** CONNECTOR

**HI 1053B** BNC

**HI 1050S** Screw Cap

**HI 1053P** BNC + PIN\*

**HI 1083X** Connector

**HI 1083B** BNC

**HI 1083P** BNC + PIN\*

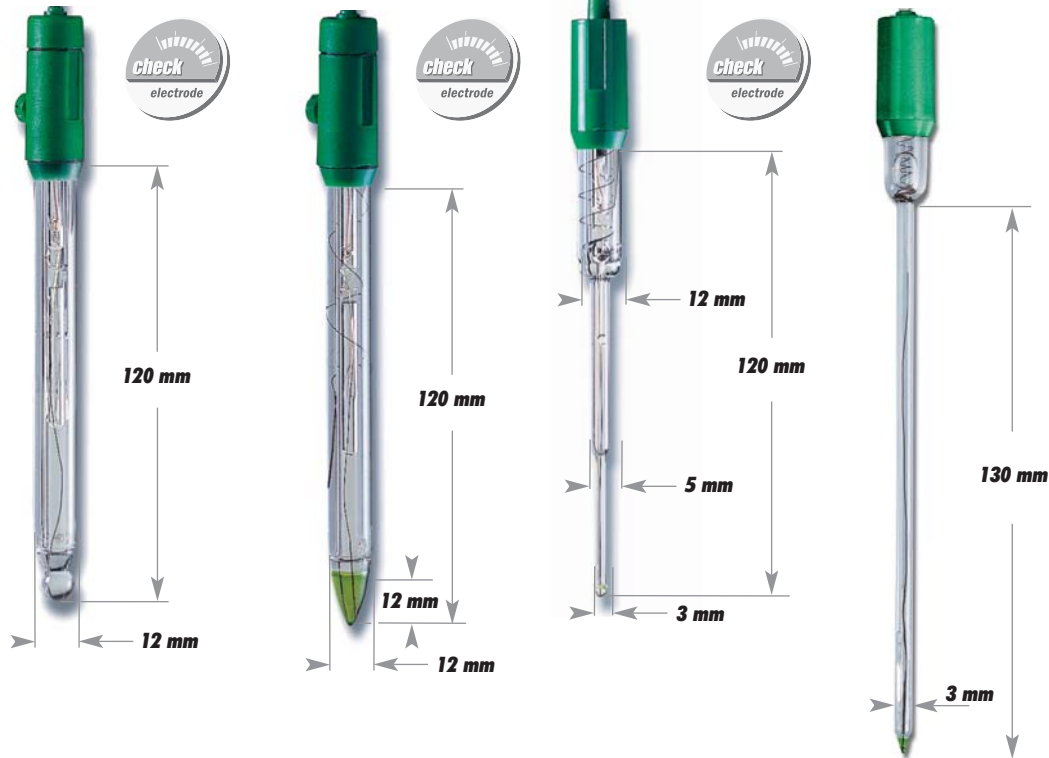
**HI 1093X** Connector

**HI 1093B** BNC

\* For pH meters with CAL CHECK™ system

\* For pH meters with CAL CHECK™ system

\* For pH meters with CAL CHECK™ system



CODE	HI 104XY	HI 105XY	HI 1083X	HI 1093X
Description	Refillable, combination pH electrode with double junction	Refillable, combination pH electrode with conical bulb	Refillable, combination pH electrode with micro bulb for small samples	Refillable, combination pH electrode with extended length & micro bulb
Reference	Double, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, triple / 40-50 µL/H	Open	Open
Electrolyte	KCl 3.5M	KCl 3.5M + AgCl	Viscolene	Viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 14 T: 0 to 100°C (32 to 212°F)	pH: 0 to 12 T: -5 to 100°C (23 to 212°F)	pH: 0 to 13 T: 0 to 50°C (32 to 122°F)	pH: 0 to 13 T: -5 to 50°C (23 to 122°F)
Tip /Shape	Spheric (dia: 9.5 mm)	Conic (12 x 12 mm)	Spheric (dia: 3 mm)	Spheric (dia: 3 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	Glass	Glass	Glass	Glass
Cable	Coaxial; 1 m (3.3')**	Coaxial; 1 m (3.3')**	Coaxial; 1 m (3.3')**	Coaxial; 1 m (3.3')
Recommended Use	Hydrocarbon, paints, solvents, sea water, strong acid and base, high conductivity samples, Tris buffer	Fats and creams, soil samples, potable water, semi solid products, low conductivity solutions, emulsions	Biotechnology, samples < 100 µl	NMR tubes

\*\* Not for models with screw cap.

Recommended Operating Temperature 30 to 85°C (104 to 185°F)

Recommended Operating Temperature -5 to 30°C (23 to 86°F)

Recommended Operating Temperature 20 to 40°C (86 to 104°F)

Recommended Operating Temperature 20 to 40°C (86 to 104°F)

# Combination pH and ORP Electrodes

pH and ORP Electrodes Designed and Manufactured by HANNA

**HI 11X1Y** CONNECTOR

**HI 1131B** BNC

**HI 1111S** Screw Cap

**HI 1131P** BNC + PIN\*

**HI 1135X** CONNECTOR

**HI 1135B** BNC

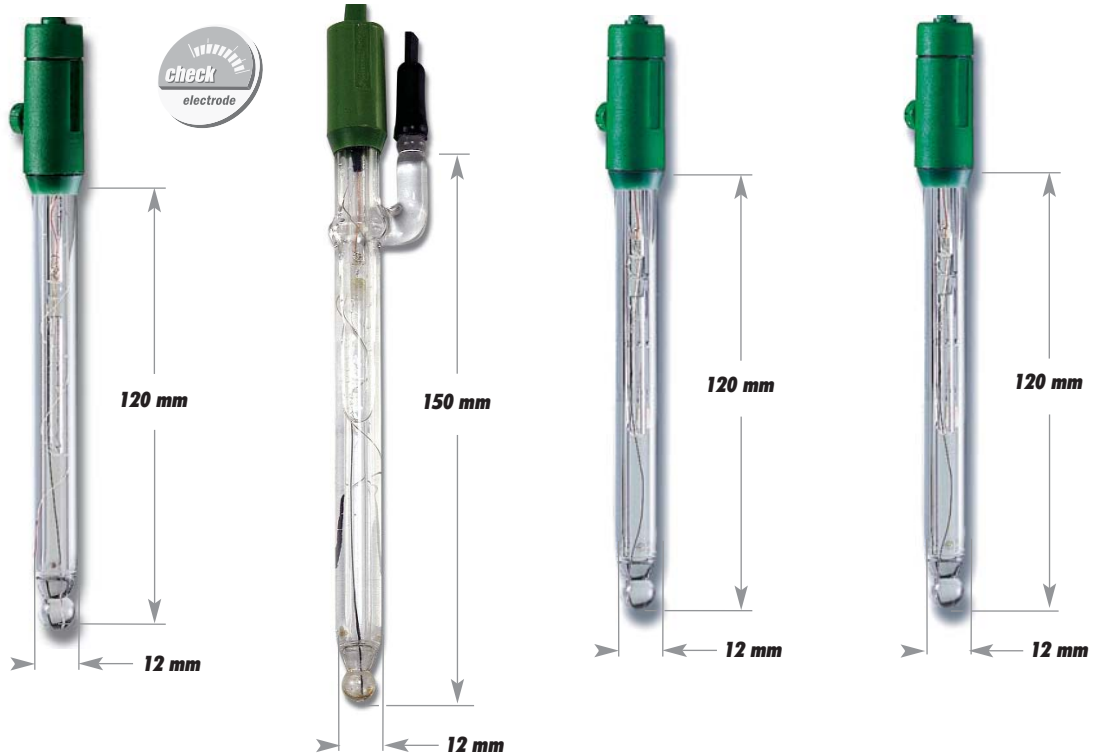
**HI 1143X** CONNECTOR

**HI 1143B** BNC

**HI 1144X** CONNECTOR

**HI 1144B** BNC

\* For pH meters with CAL CHECK™ system



CODE	HI 11X1Y	HI 1135X	HI 1143X	HI 1144X
Description	Refillable, combination pH electrode	Refillable, combination pH electrode side arm construction & fast flow rate	Refillable, combination pH electrode used for applications containing fluoride	Refillable, combination pH electrode with calomel references
Reference	Single, Ag/AgCl	Double, Ag/AgCl	Double, Ag/AgCl	Single, Hg/Hg <sub>2</sub> Cl <sub>2</sub>
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, double / 40-50 µL/H	Ceramic, single / 15-20 µL/H	Ceramic
Electrolyte	KCl 3.5M + AgCl	KCl 3.5M	KCl 3.5M	KCl 3.5M
Max Pressure	0.1 bar	3 bar with back pressure	0.1 bar	0.1 bar
Range	pH: 0 to 13 T: -5 to 100°C (23 to 212°F)	pH: 0 to 14 T: -5 to 100°C (23 to 212°F)	pH: 0 to 10 T: -5 to 60°C (23 to 140°F)	pH: 0 to 14 T: 0 to 60°C (32 to 140°F)
Tip /Shape	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	Glass	Glass	Glass	Glass
Cable	Coaxial; 1 m (3.3')**	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')
Recommended Use	Laboratory general purpose, beer	Continuous monitoring with remote filling	Samples with fluoride (max 2 g/L @ pH 2 and temperature < 60°C)	Tris buffer

\*\* Not for models with screw cap.

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
30 to 85°C (104 to 185°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Combination pH and ORP Electrodes

pH and ORP Electrodes Designed and Manufactured by HANNA

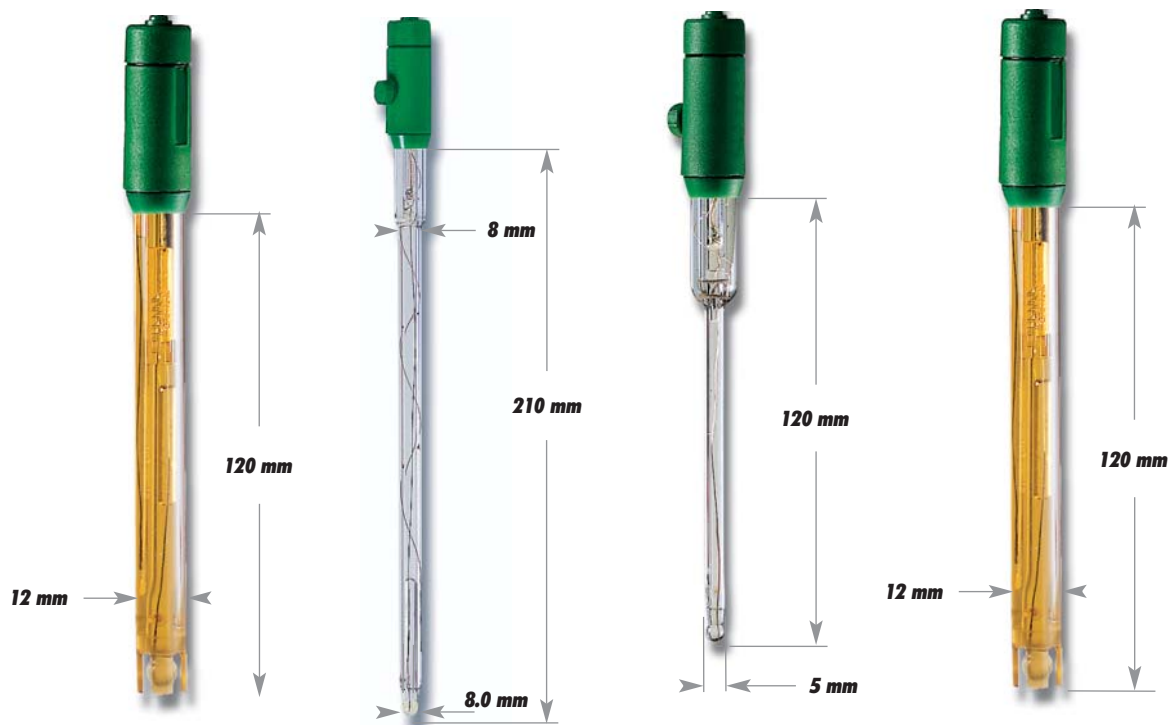
HI 12X0Y	CONNECTOR
HI 1230B	BNC
HI 1210S	Screw Cap

HI 13X1Y	CONNECTOR
HI 1331B	BNC
HI 1311S	Screw Cap

HI 13X0Y	CONNECTOR
HI 1330B	BNC
HI 1310S	Screw Cap
HI 1330P	BNC + PIN*

HI 1343X	CONNECTOR
HI 1343B	BNC

\* For pH meters with CAL CHECK™ system



CODE	HI 12X0Y	HI 13X1Y	HI 13X0Y	HI 1343Y
Description	combination pH electrode	combination pH electrode	combination pH electrode	combination pH electrode
Reference	Double, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Hg/Hg <sub>2</sub> Cl <sub>2</sub>
Junction / Flow Rate	Ceramic, single / 15-20 μL/H	Ceramic, single / 15-20 μL/H	Ceramic, single / 15-20 μL/H	Ceramic, single / 15-20 μL/H
Electrolyte	Gel	KCl 3.5M + AgCl	KCl 3.5M + AgCl	KCl 3.5M
Max Pressure	2 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 13 T: -5 to 100°C (23 to 212°F)	pH: 0 to 13 T: -5 to 100°C (23 to 212°F)	pH: 0 to 14 T: -5 to 60°C (23 to 140°F)
Tip /Shape	Spheric (dia: 7.5 mm)	Spheric (dia: 7.5 mm)	Spheric (dia: 5 mm)	Spheric (dia: 7.5 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	PEI	Glass	Glass	PEI
Cable	Coaxial; 1 m (3.3)**	Coaxial; 1 m (3.3)**	Coaxial; 1 m (3.3)**	Coaxial; 1 m (3.3)
Recommended Use	Field applications	Specific for flasks	Specific for vials and test tubes	Specific for Tris buffer

\*\* Not for models with screw cap.

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Combination pH and ORP Electrodes

pH and ORP Electrodes Designed and Manufactured by HANNA



"...a pH meter that helps you to follow strict procedures"

### Mrs. L. Paalvast

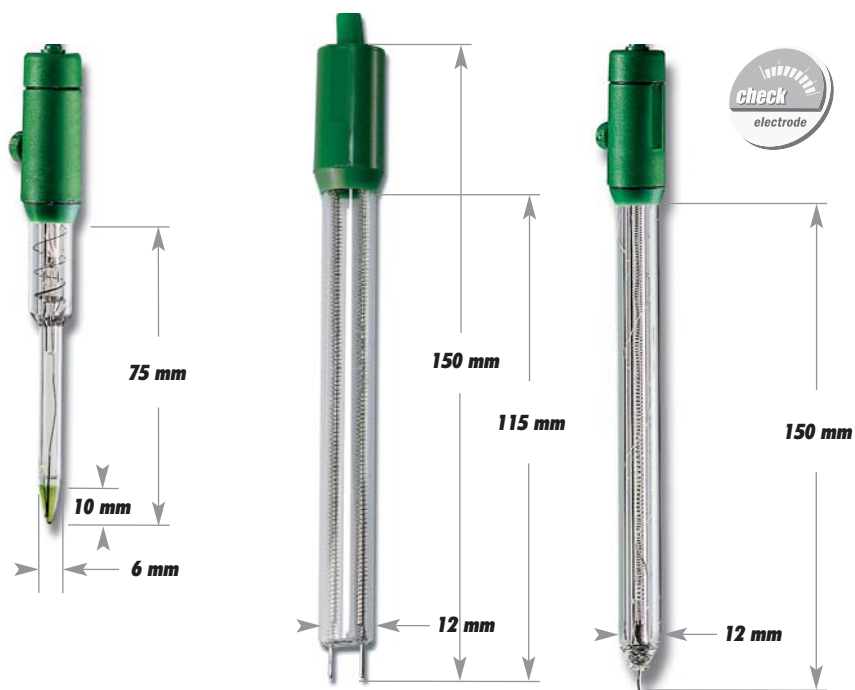
Company: Mediq Jan Heyns  
Bereidingsapotheek, the Netherlands  
Medicine producer for 5 pharmacies.

<b>HI 20XYZ</b> CONNECTOR	
<b>HI 2031B</b>	BNC
<b>HI 2020S</b>	Screw Cap

<b>HI 3118X</b> CONNECTOR	
<b>HI 3118B</b>	BNC

<b>HI 31X1Y</b> CONNECTOR	
<b>HI 3131B</b>	BNC
<b>HI 3111S</b>	Screw Cap
<b>HI 3131P</b>	BNC + PIN*

\* For pH meters with CAL CHECK™ system



CODE	HI 20XYZ	HI 3118X	HI 31X1Y
Description	Refillable, spear tip combination pH electrode	Dual platinum electrode for amperometric titration	Refillable combination ORP electrode
Reference	Single, Ag/AgCl	—	Single, Ag/AgCl
Amperometric Cell	—	Platinum-Platinum	—
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	—	Ceramic, single / 15-20 µL/H
Electrolyte	KCl 3.5M + AgCl	—	KCl 3.5M + AgCl
Max Pressure	0.1 bar	—	0.1 bar
Range	pH: 0 to 12 T: -5 to 100°C (23 to 212°F)	T: -5 to 100°C (23 to 212°F)	ORP T: -5 to 100°C (23 to 212°F)
Tip /Shape	Conic (6 x 10 mm)	2-pin platinum	Platinum pin
Temperature Sensor	No	—	No
Amplifier	No	—	No
Body Material	Glass	Glass	Glass
Cable	Coaxial; 1 m (3.3')**	Bipolar	Coaxial; 1 m (3.3')**
Recommended Use	Dairy and semi solid products	Chlorine titration ASTM D 1253-86	Laboratory general use, ORP titrations

\*\* Not for models with screw cap.

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# “Intelligent” pH and ORP Electrodes\*

pH and ORP Electrodes Designed and Manufactured by HANNA

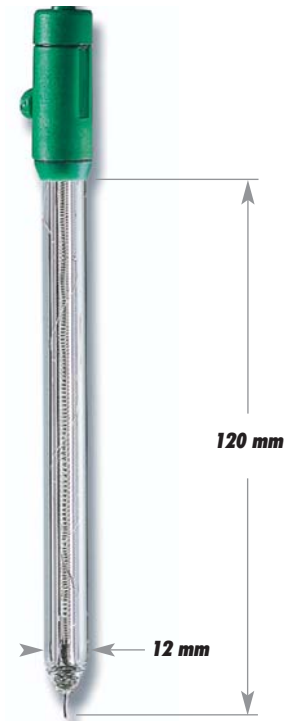
## “Intelligent Electrodes”

HANNA’s “Intelligent” electrodes are a breakthrough in electrode technology. These revolutionary electrodes incorporate microchips that memorize calibration data.

The “intelligent” electrode is recognized the moment it is connected to the meter. Once calibrated, several electrodes can be used in series without requiring new calibration. The meter can provide timely prompts about electrode status and even advise when to replace it. These “intelligent” electrodes also incorporate a temperature sensor for automatic temperature compensation.

HI 3619X CONNECTOR

HI 3619D DIN



CODE	HI 3619X
Description	ORP electrode
Reference	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 $\mu$ L/H
Electrolyte	KCl 3.5M + AgCl
Max Pressure	0.1 bar
Range	ORP: $\pm$ 2000 mV T: -5 to 80°C (23 to 176°F)
Tip /Shape	Platinum pin
Temperature Sensor	No
Amplifier	Yes
Body Material	Glass
Cable	7-pole; 1 m (3.3')
Recommended Use	Laboratory general use, disinfection

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

\* To be used with HI 98140, HI 98150, HI 98230 and HI 98240 pH meters.

# "Intelligent" pH and ORP Electrodes\*

pH and ORP Electrodes Designed and Manufactured by HANNA

**HI 1615X** CONNECTOR

**HI 1615D\*** 7-pin DIN

**HI 1616X** CONNECTOR

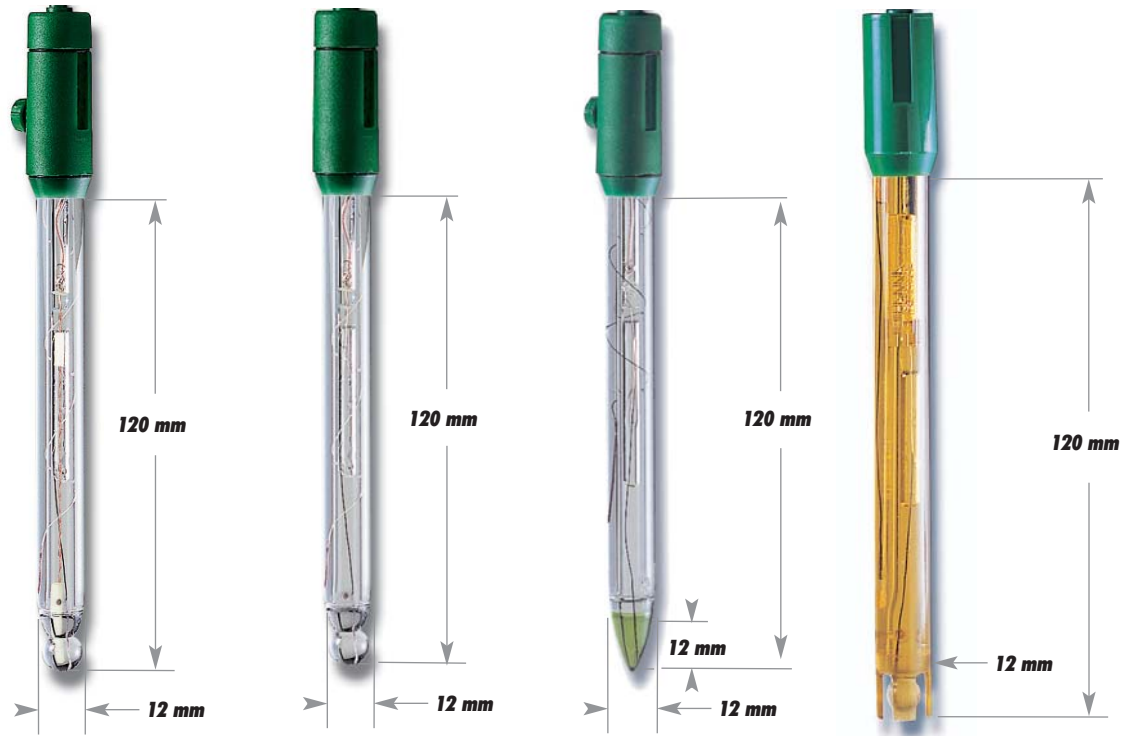
**HI 1616D\*** 7-pin DIN

**HI 1617X** CONNECTOR

**HI 1617D\*** 7-pin DIN

**HI 1618X** CONNECTOR

**HI 1618D\*** 7-pin DIN



CODE	<b>H 1615X</b>	<b>HI 1616X</b>	<b>HI 1617X</b>	<b>HI 1618X</b>
Description	pH electrode	pH electrode	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H	Ceramic, triple / 40-50 µL/H	Cloth
Electrolyte	KCl 3.5M + AgCl	Gel	KCl 3.5M + AgCl	Gel
Max Pressure	0.1 bar	up to 2 bar	0.1 bar	3 bar
Range	pH: 0 to 13 T: -5 to 100°C (23 to 212°F)	pH: 0 to 14 T: 0 to 100°C (32 to 212°F)	pH: 0 to 12 T: -5 to 100°C (23 to 212°F)	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)
Tip /Shape	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)	Conic (12 x 12 mm)	Spheric (dia: 5 mm)
Temperature Sensor	Yes	Yes	Yes	Yes
Amplifier	Yes	Yes	Yes	Yes
Body Material	Glass	Glass	Glass	Ultem®
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	Laboratory general use	Continuous monitoring	Fats and creams, soil samples, semi solid products, low conductivity solutions, emulsions	Field applications

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

\*To be used with the **HI 98140**, **HI 98150**, **HI 98230** and **HI 98240** pH meters.

# Special ORP Electrodes

with Amplified Electrodes and Platinum or Gold Tips

**HI 3618X** CONNECTOR

**HI 3618D** DIN

To be used with **HI 9210N** and **HI 8314**

**HI 3620X** CONNECTOR

**HI 3620D** DIN

Intelligent electrode

**HI 4619X** CONNECTOR

**HI 4619D** DIN

To be used with **HI 9210N** and **HI 8314**

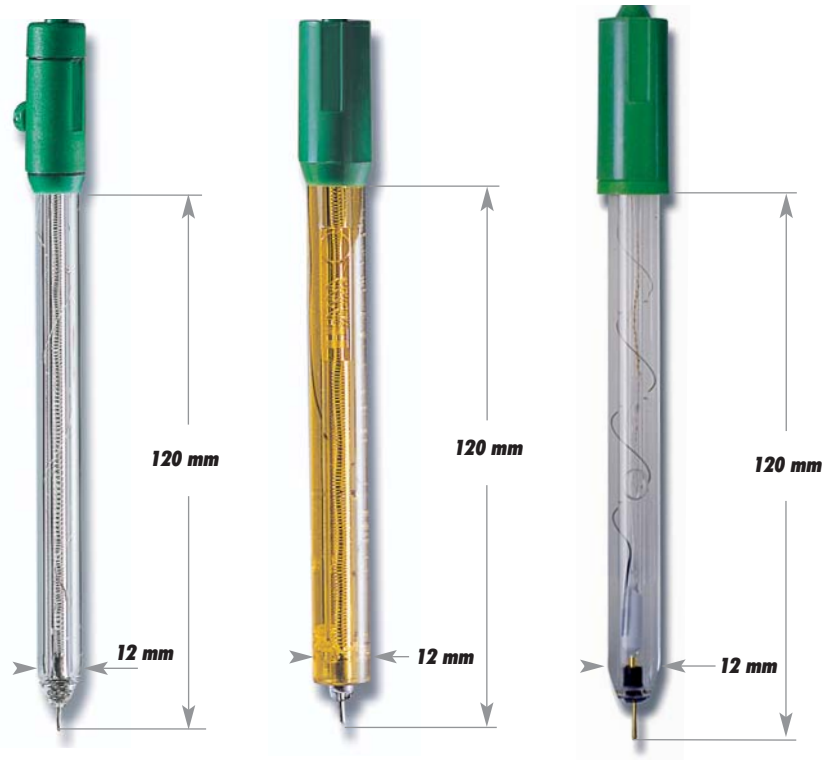
ORP measurements are used as an effective measure of the sanitation of pool, spa and potable water. E. Coli bacteria presence in water depends on the ORP value. ORP is a reliable indicator of bacteriological water quality.

## Installing and checking the electrode

ORP electrodes can be used on any HANNA pH/ORP meter.

1) After removing the protective cap from the electrode and opening the fill hole cover, soak the tip in warm tap water. This will enhance the flow of the reference junction.

2) To check the function of the electrode, immerse the tip in HI 7020 ORP test solution (HI 7020). The value should be between 200 and 275 mV. Oxidizing or reduction treatment with HI 7092 or HI 7091 will prepare the electrode's surface and speed initial response time.



CODE	HI 3618X	HI 3620X	HI 4619X
Description	ORP electrode	ORP electrode	ORP electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H	Ceramic, triple / 40-50 µL/H
Electrolyte	KCl 3.5M + AgCl	Gel	Gel
Max Pressure	0.1 bar	2 bar	2 bar
Range	ORP: ±2000 mV T: -5 to 100°C (23 to 212°)	ORP: ±2000 mV T: 0 to 80°C (32 to 176°F)	ORP: ±2000 mV T: -5 to 100°C (23 to 212°)
Tip /Shape	Platinum pin	Platinum pin	Gold pin
Temperature Sensor	Yes	No	Yes
Amplifier	Yes	Yes	Yes
Body Material	Glass	PEI	Glass
Cable	5-pole; 1 m (3.3')	7-pole; 1 m (3.3')	5-pole; 1 m (3.3')
Recommended Use	Laboratory	Field applications, swimming pools	Strong oxidants, disinfection with ozone

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Amplified pH Electrodes with Temperature Sensor

pH Electrodes with Temperature Measurement Capability

**HI 1217X** CONNECTOR

**HI 1217D** DIN\*

**HI 1217S** Screw Cap†

**HI 1611X** CONNECTOR

**HI 1611D** DIN\*

**FC 211X** CONNECTOR

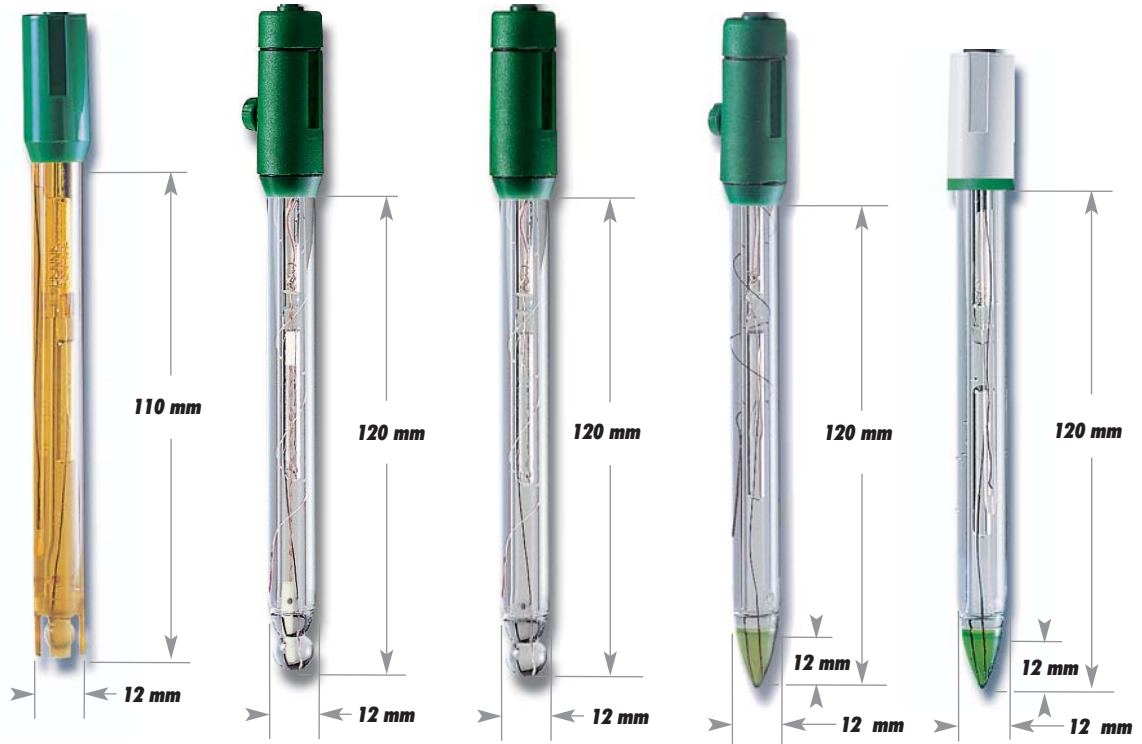
**FC 211D** DIN\*

**HI 1610X** CONNECTOR

**HI 1610D** DIN\*

**HI 1612X** CONNECTOR

**HI 1612D** DIN\*



CODE	HI 1217X	HI 1610X	HI 1611X	HI 1612X	FC 211X
Description	pH electrode	pH electrode	pH electrode	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H	Ceramic, triple / 40-50 µL/H	Open
Electrolyte	Gel	KCl 3.5M + AgCl	Gel	KCl 3.5M + AgCl	Viscolene
Max Pressure	2 bar	0.1 bar	2 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 13 T: -5 to 100°C (23 to 212°F)	pH: 0 to 14 T: 0 to 100°C (32 to 212°F)	pH: 0 to 12 T: -5 to 100°C (23 to 212°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)
Tip /Shape	Spheric (dia: 5.0 mm)	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)	Conic (12 x 12 mm)	Conic (12 x 12 mm)
Temperature Sensor	Yes	Yes	Yes	Yes	Yes
Amplifier	Yes	Yes	Yes	Yes	Yes
Body Material	PEI	Glass	Glass	Glass	Glass
Cable**	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')	5-pole; 1 m (3.3')
Recommended Use	General purpose	Laboratory general use	Continuous monitoring	Emulsions, semi solid samples	Milk, yogurt, cream

\*\* Not for models with screw cap.

Recommended Operating Temperature 20 to 40°C (86 to 104°F)

Recommended Operating Temperature 20 to 40°C (86 to 104°F)

Recommended Operating Temperature 30 to 85°C (104 to 185°F)

Recommended Operating Temperature -5 to 30°C (23 to 86°F) + 20 to 40°C (86 to 104°F)

Recommended Operating Temperature -5 to 30°C (23 to 86°F)

\*To be used with **HI 9210N** and **HI 8314**

† To be used with **HI 9214**

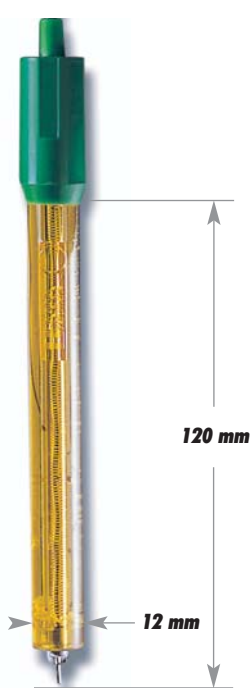


**Rugged**

# pH and ORP Electrodes

*Designed for General Use***5****ISE/pH****HI 13X2Y** CONNECTOR**HI 1332B** BNC**HI 1312S** Screw Cap**HI 1332P** BNC + PIN\***HI 32X0Y** CONNECTOR**HI 3230B** BNC**HI 3210S** Screw Cap**HI 44X0Y** CONNECTOR**HI 4430B** BNC**HI 4410S** Screw Cap

\* For pH meters with CAL CHECK™ system



CODE	HI 13X2Y	HI 32X0Y	HI 44X0Y
Description	pH electrode	ORP electrode	Gel filled, combination ORP electrode with gold contact
Reference	Double, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H	Ceramic, single / 15-20 µL/H
Electrolyte	KCl 3.5M	Gel	Gel
Max Pressure	0.1 bar	2 bar	2 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	ORP: ±2000 mV T: 0 to 80°C (32 to 176°F)	ORP: ±2000 mV T: 0 to 80°C (32 to 176°F)
Tip /Shape	Spheric (dia: 7.5 mm)	Platinum pin	Gold pin
Temperature Sensor	No	No	No
Amplifier	No	No	No
Body Material	PEI	PEI	PEI
Cable**	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')
Recommended Use	Chemicals, field applications, quality control	Municipal water, quality control	Oxidants, ozone

\*\* Not for models with screw cap.

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)Recommended Operating Temperature  
20 to 40°C (86 to 104°F)Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Food Industry Specific Electrodes

Designed for Laboratories, Food Processing, Goods-in Areas and Service Industries

**FC 100X** CONNECTOR

**FC 100B** BNC

**FC 200X** CONNECTOR

**FC 200B** BNC

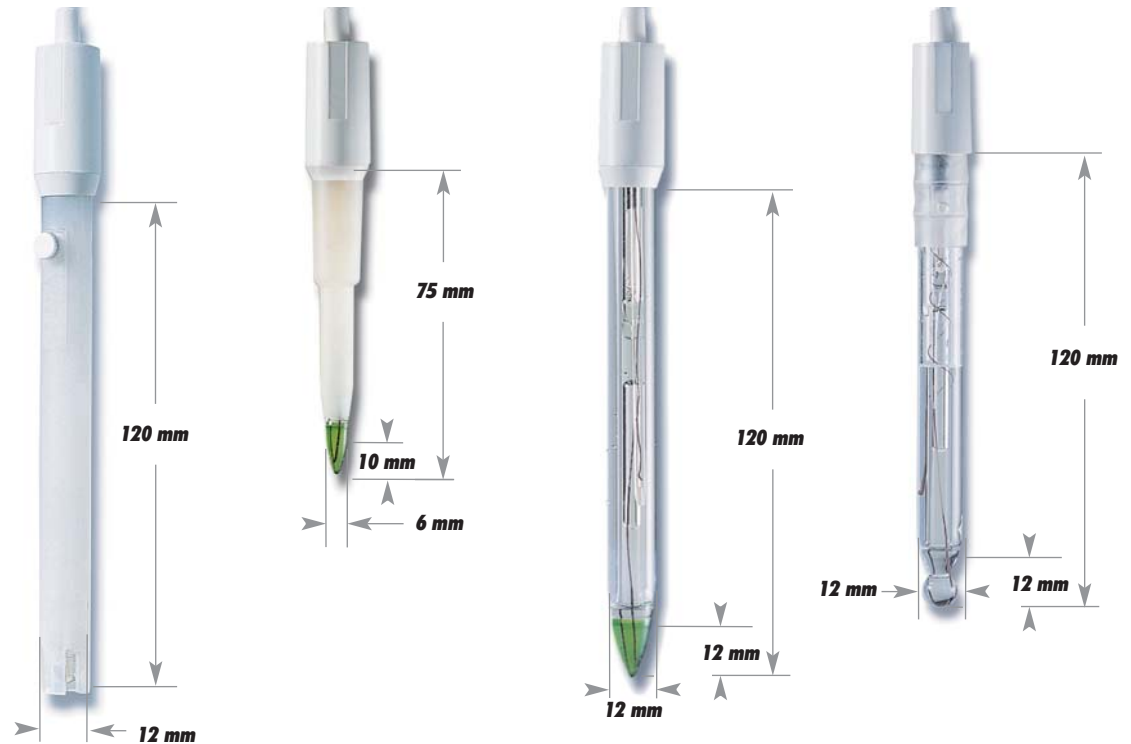
**FC 200S** Screw Cap

**FC 210X** CONNECTOR

**FC 210B** BNC

**FC 220X** CONNECTOR

**FC 220B** BNC



CODE	FC 100X	FC 200X	FC 210X	FC 220X
Description	pH electrode	pH electrode	pH electrode	pH electrode
Reference	Double, Ag/AgCl	Single, Ag/AgCl	Double, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	Open	Open	Ceramic, triple / 40-50 µL/H
Electrolyte	KCl 3.5M	Viscolene	Viscolene	KCl 3.5M + AgCl
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 12 T: 0 to 100°C (32 to 212°F)
Tip /Shape	Spheric (dia: 7.5 mm)	Conic (6 x 10 mm)	Conic (12 x 12 mm)	Spheric (dia: 9.5 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	PVDF	PVDF	Glass	Glass
Cable**	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')
Recommended Use	Cheese	Milk, yogurt, dairy products, semi solid foods	Milk, yogurt, creams	Creams, fruit juices, sauces

\*\* Not for models with screw cap.

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

# Food Industry Specific Electrodes

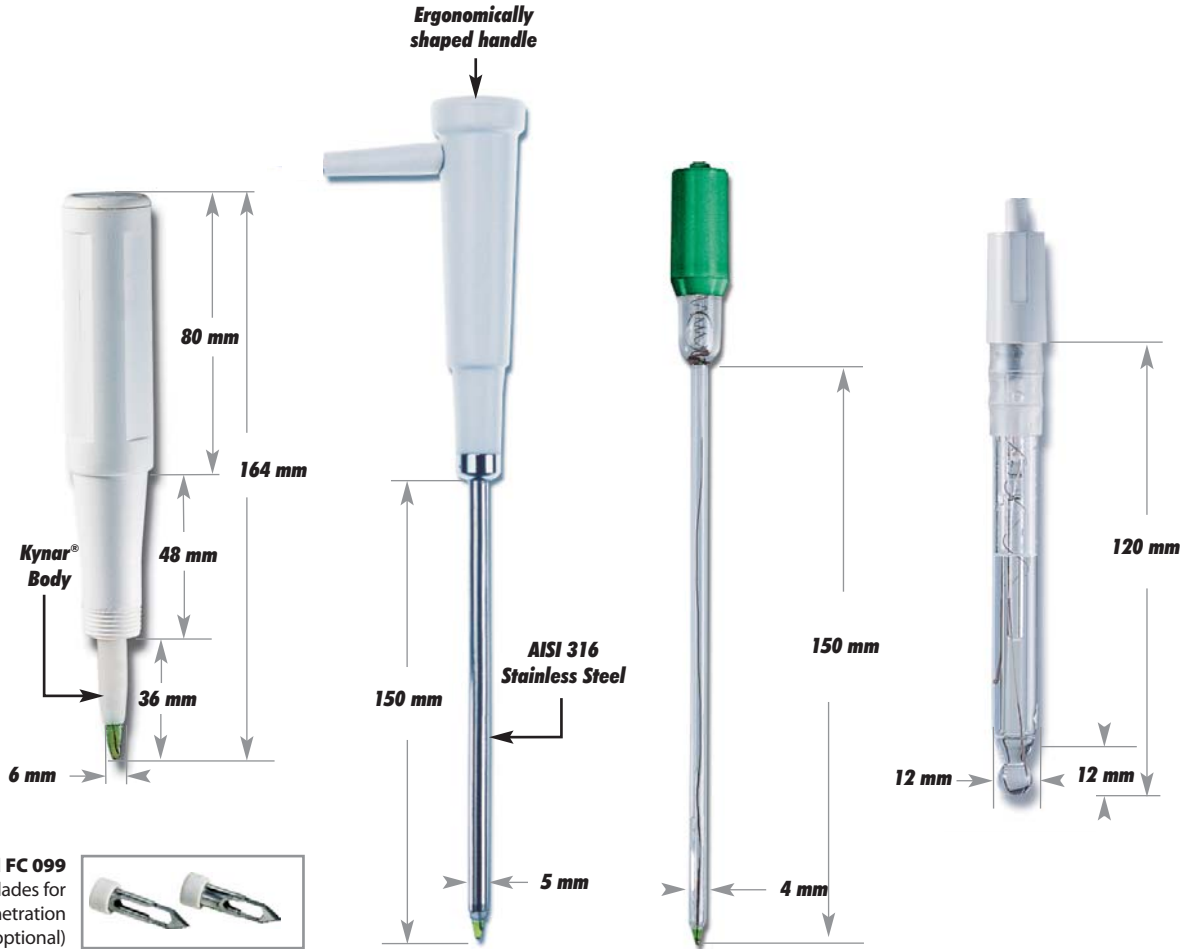
Designed for Laboratories, Food Processing, Goods-in Areas and Service Industries

<b>FC 230X</b>	CONNECTOR
<b>FC 230B</b>	BNC

<b>FC 240X</b>	CONNECTOR
<b>FC 240B</b>	BNC

<b>FC 250X</b>	CONNECTOR
<b>FC 250B</b>	BNC

<b>FC 300X</b>	CONNECTOR
<b>FC 300B</b>	BNC



CODE	FC 230X	FC 240X	FC 250X	FC 300X
Description	Combination pH electrode with PVDF outer body	Combination pH electrode with stainless steel sheath	Combination pH electrode with long, thin body	Combination sodium ion electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Double, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Open	Open	Open	Ceramic, triple / 40-50 µL/H
Electrolyte	Viscolene	Viscolene	Viscolene	KCl 3.5M + AgCl
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 13 T: 0 to 50°C (32 to 122°F)	pH: 0 to 13 T: 0 to 50°C (32 to 122°F)	Na+: 10 <sup>-4</sup> to 3x10 <sup>3</sup> g/L / T: 0 to 100°C (32 to 212°F)
Tip /Shape	Conic (6 x 10 mm)	Conic (3 x 5 mm)	Conic (3 x 5 mm)	Spheric (dia: 9.5 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	PVDF	AISI 316	Glass	Glass
Cable	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')
Recommended Use	Meat, semi frozen products	Dairy products, cheese quality control	Dairy products, semi mature cheese	Food products, laboratory

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
20 to 40°C (66 to 104°F)

Recommended Operating Temperature  
20 to 40°C (66 to 104°F)

Recommended Operating Temperature  
20 to 40°C (66 to 104°F)

# Food Industry Specific Electrodes

Designed for Laboratories, Food Processing, Goods-in Areas and Service Industries

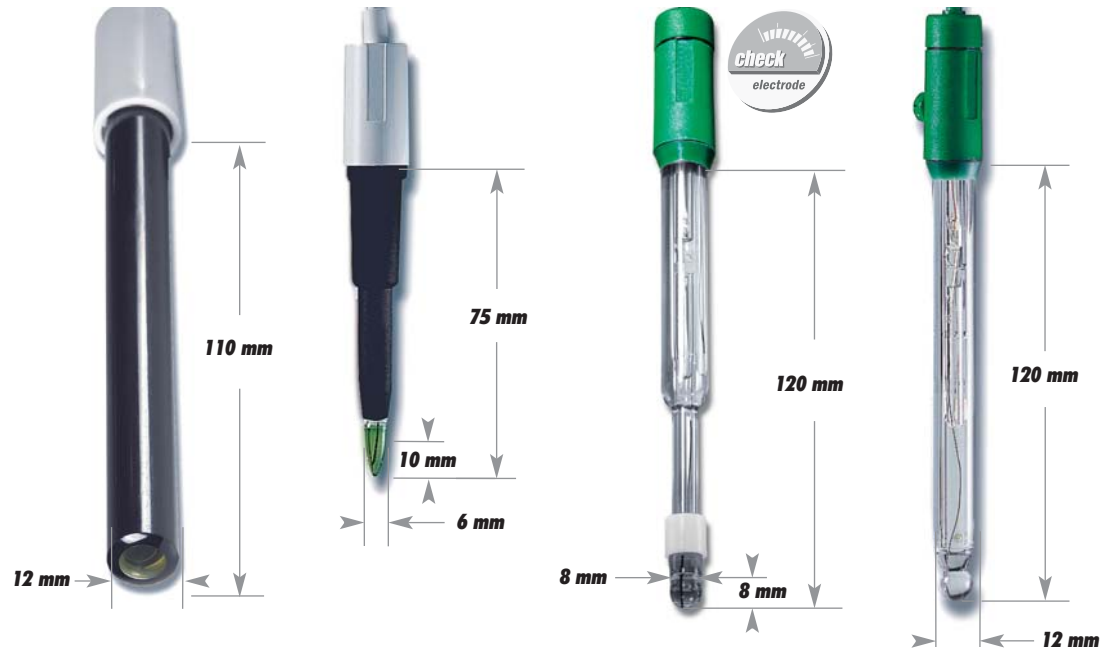
<b>FC 301X</b>	CONNECTOR
<b>FC 301B</b>	BNC

<b>FC 400X</b>	CONNECTOR
<b>FC 400B</b>	BNC

<b>HI 1048X</b>	CONNECTOR
<b>HI 1048B</b>	BNC
<b>HI 1048P</b>	BNC + PIN*

<b>HI 1153X</b>	CONNECTOR
<b>HI 1153B</b>	BNC

\* To be used with pH meter with CAL CHECK™ system



CODE	FC 301X	FC 400X	HI 1048X	HI 1153X
Description	Fluoride electrode	pH electrode	pH electrode with Clogging Prevention System (CPS™)	pH electrode
Reference	—	Single, Ag/AgCl	Double, Ag/AgCl	Double, Ag/AgCl
Junction / Flow Rate	—	Open	Open, CPS™	Ceramic, triple / 40-50 µL/H
Electrolyte	—	Viscolene	KCl 3.5M	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	0.1 bar	0.1 bar
Range	Fluoride: 10 <sup>-6</sup> to saturation / T: -5 to 35°C (23 to 95°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 13 T: -5 to 80°C (23 to 176°F)	pH: 0 to 13 T: 0 to 100°C (32 to 212°F)
Tip /Shape	Flat	Conic (3 x 5 mm)	Spheric (dia: 8 mm)	Spheric (dia: 9.5 mm)
Temperature Sensor	No	No	No	No
Amplifier	No	No	No	No
Body Material	PEI	PVDF	Glass	Glass
Cable	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')
Recommended Use	Wastewater, heavy-duty applications, glass production, electronic industry	Meat	Wine, must	Mineral water

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Food Industry Specific "Intelligent" Electrodes\*\*

Designed for Laboratories, Food Processing, Goods-in Areas and Service Industries

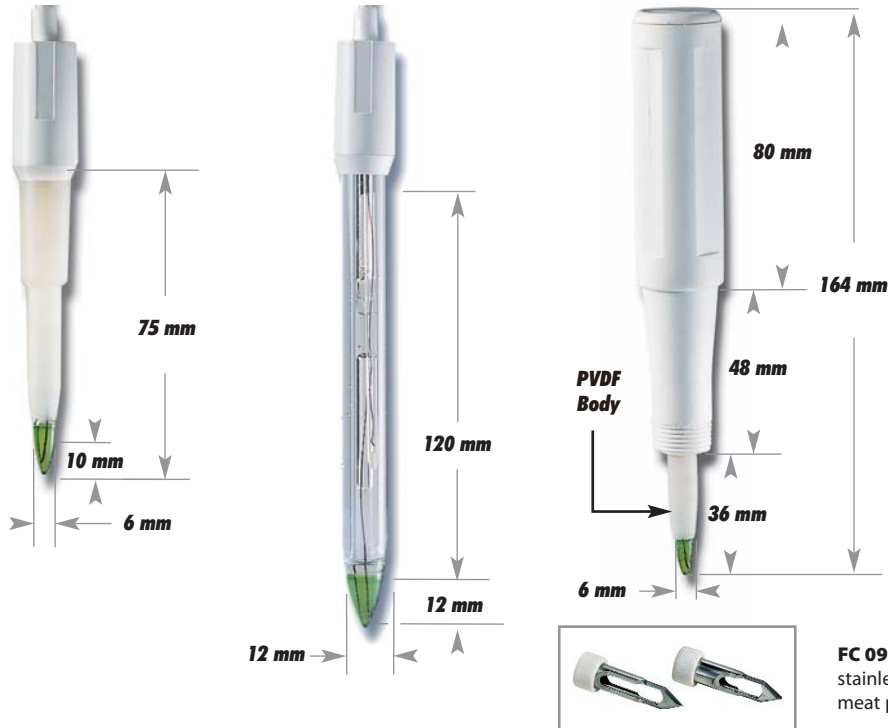
<b>FC 20XY</b>	CONNECTOR
<b>FC 201D</b>	DIN
<b>FC 202D<sup>†</sup></b>	DIN

<sup>†</sup> To be used with **HI 99161**

<b>FC 212X</b>	CONNECTOR
<b>FC 212D</b>	DIN

<b>FC 23XY</b>	CONNECTOR
<b>FC 231D</b>	DIN
<b>FC 232D*</b>	DIN

\* To be used with **HI 99163**



**FC 098 and FC 099**  
stainless steel blades for  
meat penetration

CODE	FC 201XY	FC 212X	FC 23XY
Description	pH electrode	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction	Open	Open	Open
Electrolyte	Viscolene	Viscolene	Viscolene
Max Pressure	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)	pH: 0 to 12 T: 0 to 50°C (32 to 122°F)
Tip /Shape	Conic (6 x 10 mm)	Conic (12 x 12 mm)	Conic (6 x 10 mm)
Temperature Sensor	Yes	Yes	Yes
Amplifier	Yes	Yes	Yes
Body Material	PVDF	Glass	PVDF
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	Milk, yogurt, dairy products, meat, semi solid foods	Milk, yogurt, creams	Meat

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

\*\* To be used with **HI 98140, HI 98150, HI 98230** and **HI 98240** pH meters.

## Food Industry Electrode

with Amplifier

**FC 911X** CONNECTOR

**FC 911B** BNC



CODE	<b>FC 911X</b>
Description	pH electrode with amplifier
Reference	Double, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)
Tip /Shape	Spheric (dia: 7.5 mm)
Temperature Sensor	No
Amplifier	Yes
Body Material	PVDF
Cable	Coaxial; 1 m (3.3')
Recommended Use	Creams, fruit juices, sauces

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

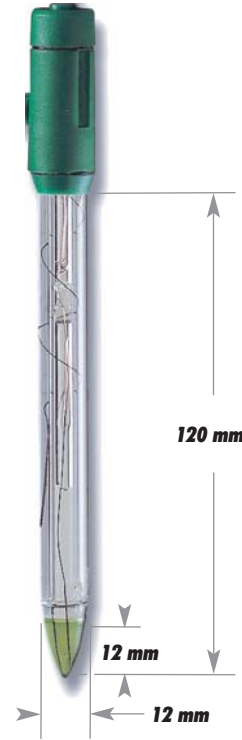
## Special Application Electrodes

Electrodes to Perform a Specific Analysis

**HI 1292X** CONNECTOR

**HI 1292D** 7-pin DIN\*

\* To be used with **HI 99121**



CODE	<b>HI 1292X</b>	<b>HI 1296X</b>
Description	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flow Rate	Ceramic, triple / 40-50 µL/H	Cloth
Electrolyte	KCl 3.5M + AgCl	Gel
Max Pressure	0.1 bar	3 bar
Range	pH: 0 to 12 T: -5 to 100°C (23 to 212°F)	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)
Tip /Shape	Conic (12 x 12 mm)	Spheric (dia: 5 mm)
Temperature Sensor	Yes	Yes
Amplifier	Yes	Yes
Body Material	Glass	AISI 316 stainless steel
Cable	7-pole; 1 m (3.3')	5-pole; 1 m (3.3')
Recommended Use	Direct soil pH measurement, soil solution	Wastewater

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) + 20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Special Application Electrodes

Electrodes to Perform a Specific Analysis

**HI 1297X** CONNECTOR

**HI 1297D** DIN\*

\* To be used with **HI 991002**  
and **HI 991003**

**HI 1413X** CONNECTOR

**HI 1413B** BNC

**HI 1413X/50** CONN.

**HI 1413B/50** BNC‡

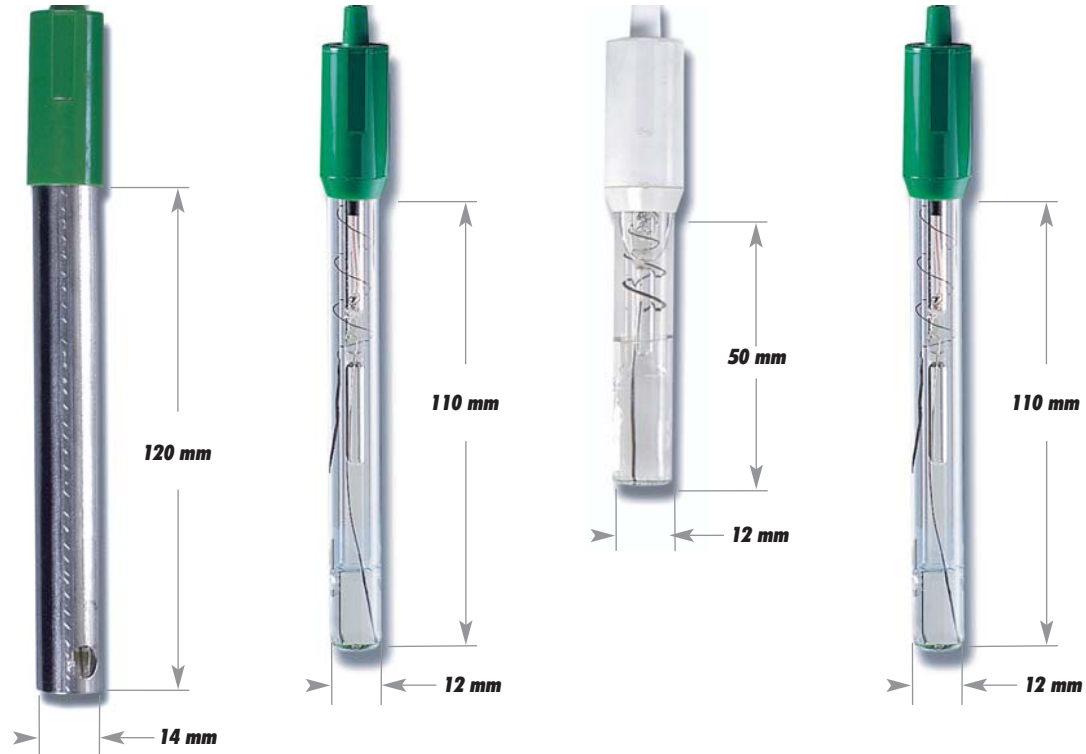
**HI 1413S/50** Screw Cap‡

‡ To be used with **Skincheck™** series

**HI 1414X** CONNECTOR

**HI 1414D** 7-pin DIN†

† To be used with **HI 99171**



CODE	HI 1297X	HI 1413X	HI 1413X/50	HI 1414X
Description	pH/ORP electrode with titanium cage	pH electrode	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl	Single, Ag/AgCl
Junction	Cloth	Open	Open	Open
Electrolyte	Gel	Viscolene	Viscolene	Viscolene
Max Pressure	3 bar	0.1 bar	0.1 bar	0.1 bar
Range	pH: 0 to 13; ORP T: 0 to 80°C (32 to 176°F)	pH: 0 to 12 T: -5 to 50°C (23 to 122°F)	pH: 0 to 12 T: -5 to 50°C (23 to 122°F)	pH: 0 to 12 T: -5 to 50°C (23 to 122°F)
Tip /Shape	pH: Conic (3 mm) ORP: Platinum sensor	Flat	Flat	Flat
Temperature Sensor	Yes	No	No	Yes
Amplifier	Yes	No	No	Yes
Body Material	AISI 316 stainless steel	Glass	Glass	Glass
Cable**	7-pole; 1 m (3.3')	Coaxial; 1 m (3.3')	Coaxial; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	Wastewater, municipal water, water treatment, swimming pools	Surfaces, skin, leather, paper, emulsions	Skin, scalp	Surface, leather, paper, emulsions

\*\* Not for models with screw cap. Recommended Operating Temperature 20 to 40°C (86 to 104°F)

# Special Application Electrodes

Electrodes to Perform a Specific Analysis

**HI 1414X/50** CONN.

**HI 1414D/50** DIN\*

\* To be used with **HI 99181**

**HI 62911X** CONNECTOR

**HI 62911D** DIN\*\*

\*\* To be used with **HI 99131**

**HI 62920X** CONNECTOR

**HI 62920D** DIN†

† To be used with **HI 504920**

**HI 72911X** CONNECTOR

**HI 72911D** DIN‡

‡ To be used with **HI 99141**



CODE	<b>HI 1414X/50</b>	<b>HI 62911X</b>	<b>HI 62920X</b>	<b>HI 72911X</b>
Description	pH electrode	pH electrode	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Double, Ag/AgCl	Double, Ag/AgCl	Double, Ag/AgCl
Junction	Open	PTFE	PTFE	PTFE
Electrolyte	Viscolene	Polymer	Polymer	Polymer
Max Pressure	0.1 bar	3 bar	3 bar	3 bar
Range	pH: 0 to 12 T: -5 to 50°C (23 to 122°F)	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)
Tip /Shape	Flat	Flat	Flat	Flat
Temperature Sensor	Yes	Yes	Yes	Yes
Amplifier	Yes	Yes	Yes	Yes
Body Material	Glass	Titanium cage working as Matching Pin	Titanium cage working as Matching Pin	AISI 316 stainless steel
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 2 m (6.6')	7-pole; 1 m (3.3')
Recommended Use	Skin, scalp	Plating baths	Industrial applications	Cooling towers, boilers

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)



## Fail Safe Technology

The development of new technologies and the diffusion of environmental controls have urged the need to measure the pH.

As a result, the use of pH meters is spreading, opening the way to more specific and demanding requirements.

It is for this very reason that HANNA is suggesting the new Fail Safe Technology (F.S.T.).

In fact, for all cases where the pH value is close to 7, the electrodes produced thus far fail to make a distinction between a correct reading and a malfunction.

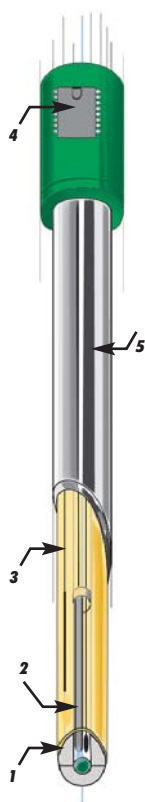
The F.S.Technology overcomes this inconvenience by modifying the production process of the electrodes and the reading system of the related instruments.

This new system makes it easy to identify erroneous readings in solutions having a pH value close to 7, since the pH meter will display a pH value close to 4.

The problem with the common pH electrodes is due to the fact that they relate the pH value of 7 to an EMF equal to 0 mV. But the EMF may be equal to 0 mV under many circumstances, as for example, when the connecting cable is short circuited, or if there is a connector leakage.

In such cases, the pH meter will always read pH 7, even when the electrode is dipped into a very acidic or alkaline solution.

The F.S.Technology, instead, assigns the 0 mV value to pH 4, so that in all those cases with pH equal to 7, if the electrode leaks, the cable short circuits, or there is liquid on the connectors, the instrument will display a pH 4 reading and the operator will be immediately alerted.



## Titanium Casings

The HI 62911 and HI 62920 advanced electrodes with Titanium cage also feature:

- 1) Annular PTFE junction for clogging prevention
- 2) Double junction and polymer electrolyte for enhanced protection against contamination of the reference electrolyte
- 3) Built-in temperature sensor for ATC and, therefore, accurate readings
- 4) Built-in amplifier for reducing the effect of electromagnetic interferences, typical of the industrial environments
- 5) Matching Pin

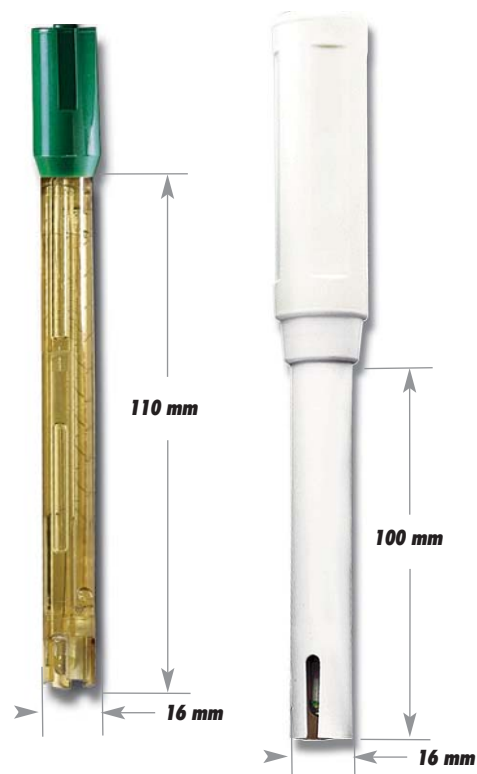
HI 1217-6X CONNECTOR

HI 1217-6D DIN\*

\* To be used with HI 83140

HI 1285-X Multi-pin for HI 9813 series

HI 1285-6 w/temperature sensor & CAL-CHECK™



CODE	HI 1217-6	HI1285
Description	pH electrode	pH electrode
Reference	Single, Ag/AgCl	Single, Ag/AgCl
Junction / Flowrate	Ceramic, single / 15-20 µL/H	Cloth
Electrolyte	Gel	Gel
Max Pressure	2 bar	0.1 bar
Range	pH: 0 to 13 T: 0 to 80°C (32 to 176°F)	pH: 0 to 13 / EC T: 0 to 60°C (32 to 140°F)
Tip / Shape	Spheric (dia: 5.0 mm)	Spheric (dia: 8.0 mm)
Temperature Sensor	Yes	Yes
Amplifier	Yes	Yes
Body Material	PEI	Polypropylene
Cable	5-pole; 1 m (3.3')	7-pole; 2 m (3.3')
Recommended Use	Field applications, environmental monitoring	Greenhouses, hydroponics, environmental monitoring, water treatment, boilers, cooling towers

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

## pH Half Cells

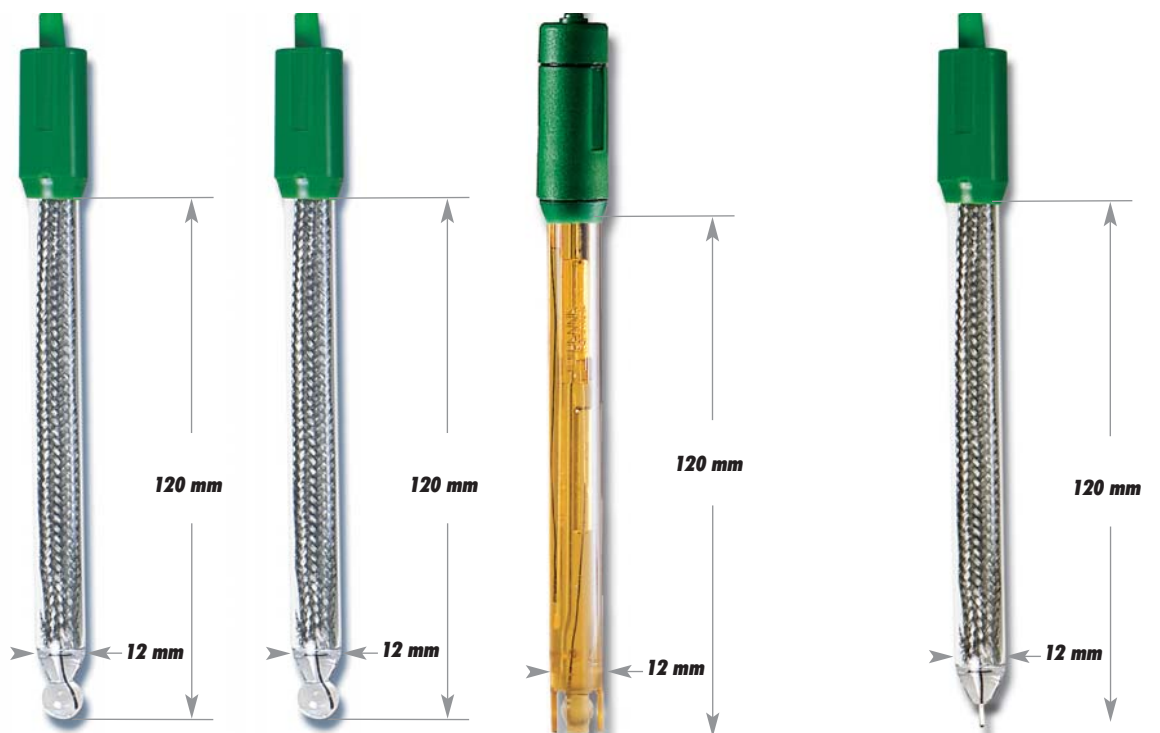
Designed and Created by the Manufacturer ... HANNA instruments®

**HI 2110X** CONNECTOR  
**HI 2110B** BNC

**HI 2112X** CONNECTOR  
**HI 2112B** BNC

**HI 3133X** CONNECTOR  
**HI 3133B** BNC

**HI 2111X** CONNECTOR  
**HI 2111B** BNC



CODE	HI 2110X	HI 2111X	HI 2112X
Description	pH half-cell	pH half-cell	pH half-cell
pH Half Cell	—	—	—
Range	pH: 0 to 12 T: -5 to 80°C (23 to 176°F)	pH: 0 to 14 T: 0 to 100°C (32 to 212°F)	pH: 0 to 13 T: -5 to 80°C (23 to 176°F)
Tip /Shape	Spheric (dia: 9.5 mm)	Spheric (dia: 9.5 mm)	Spheric (dia: 7.5 mm)
Body Material	Glass	Glass	PEI
Cable	Coaxial	Coaxial	Coaxial
Recommended Use	Titration	General purpose, strong alkaline solutions	General purpose

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
30 to 85°C (104 to 185°F)

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

CODE	HI 3133X
Description	ORP half-cell
ORP Half Cell	Platinum
Range	mV T: -5 to 80°C (23 to 176°F)
Tip /Shape	Platinum pin
Body Material	Glass
Cable	Coaxial
Recommended Use	General purpose, potentiometric titration

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

# Reference Electrodes

Double and Single Reference Electrodes

**HI 5110X** CONNECTOR

**HI 5110B** BNC

**HI 5412** CONNECTOR

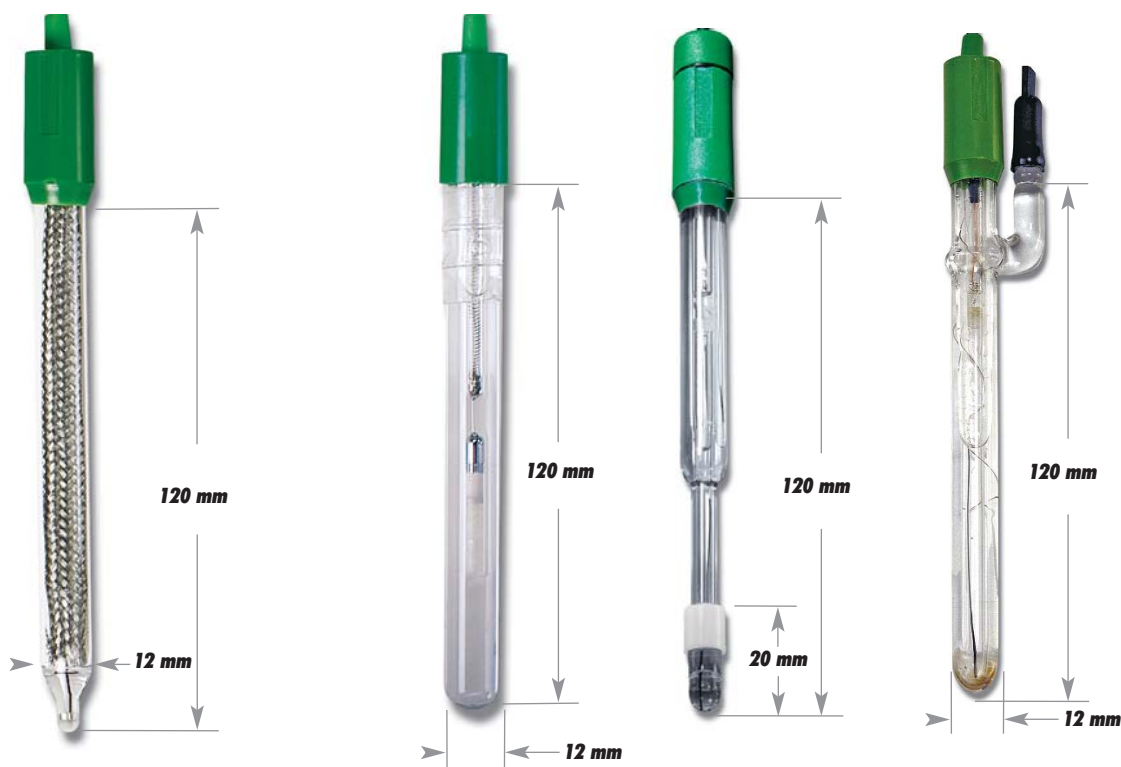
**HI 5412** 4 mm  
Banana

**HI 5414** CONNECTOR

**HI 5414** 4 mm  
Banana

**HI 5413** CONNECTOR

**HI 5413** 4 mm  
Banana



CODE	HI 5110X
Description	ORP half-cell
ORP Half Cell	Ag
Range	mV T: -5 to 80°C (23 to 176°F)
Tip /Shape	Cylindric (dia: 3 mm)
Body Material	Glass
Cable	Coaxial
Recommended Use	Argentometric titration

Recommended Operating Temperature  
20 to 40°C (86 to 104°F)

CODE	HI 5412	HI 5413	HI 5414
Description	Reference electrode	Reference electrode	Reference electrode
Reference	Single, Hg/Hg <sub>2</sub> Cl <sub>2</sub>	Single, Hg/Hg <sub>2</sub> Cl <sub>2</sub>	Single, Hg/Hg <sub>2</sub> Cl <sub>2</sub>
Junction/FlowRate	Ceramic, single / 15-20 µL/H	PTFE sleeve	Ceramic, double
Electrolyte	KCl 3.5M	KCl 3.5M	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	3 bar with back pressure
Range	T: -5 to 60°C (23 to 140°F)	T: -5 to 60°C (23 to 140°F)	T: -5 to 60°C (23 to 140°F)
Body Material	Glass	Glass	Glass
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	General purpose, ISE, titrations	Samples with suspended solids, ISE	Measurements with remote filling

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

## High Pressure or High Concentration of Contaminants.

Because of the special electrode recharge system of the HI 5414, it is possible to connect an outside container to increase the amount of electrolyte of the reference half-cell and thus the pressure inside the electrode. By so doing, the junction will be able to work in high-pressure environments without the danger of implosion.



# Reference Electrodes

Double and Single Reference Electrodes

**HI 5311** CONNECTOR

**HI 5311** 4 mm  
Banana

**HI 5312** CONNECTOR

**HI 5312** 4 mm  
Banana

**HI 5313** CONNECTOR

**HI 5313** 4 mm  
Banana

**HI 5314** CONNECTOR

**HI 5314** 4 mm  
Banana



CODE	HI 5311	HI 5312	HI 5313	HI 5314
Description	Reference electrode	Reference electrode	Reference electrode	Reference electrode
Reference	Double, Ag/AgCl	Double, Ag/AgCl	Single, Ag/AgCl	Double, Ag/AgCl
Junction / Flow Rate	Ceramic, single / 15-20 µL/H	PTFE sleeve	Ceramic	Ceramic, double
Electrolyte	KCl 3.5M	KCl 3.5M	Gel (KCl 1M + AgCl)	KCl 3.5M
Max Pressure	0.1 bar	0.1 bar	0.1 bar	3 bar with back pressure
Range	T: -5 to 100°C (23 to 212°F)	T: -5 to 100°C (23 to 212°F)	T: -5 to 35°C (23 to 95°F)	T: -5 to 100°C (23 to 212°F)
Body Material	Glass	Glass	PEI	Glass
Cable	1 m (3.3')	1 m (3.3')	1 m (3.3')	1 m (3.3')
Recommended Use	General purpose (wide temperature range), titrations	Titration, samples with suspended solids	Used with FC 301B	Measurements with remote filling

Recommended Operating Temperature  
30 to 85°C (104 to 185°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F) +  
20 to 40°C (86 to 104°F)

Recommended Operating Temperature  
-5 to 30°C (23 to 86°F)

Recommended Operating Temperature  
30 to 85°C (104 to 185°F)