

Electrodes



● Overview

Consort offers a wide variety high quality electrochemical analytical sensors. Our pH, ORP (Oxidation-Reduction Potential), Conductivity, Oxygen and Ion Selective Electrodes (ISEs) are designed for Laboratory, Industrial, Biotechnology and Medical applications.

The most common electrodes are in our catalogue. We can supply variations depending on your needs: body style, submersible, cable length, body length, connector type, ATC type,...

Most of our electrodes can be delivered from stock. ISE's are never delivered from stock because of it's limited shelf life. An ISE is manufactured on demand and as such will guarantee an ideal shelf life combined with a low price.

● Tips and tricks

While calibrating or measuring, all solutions should be stirred gently to ensure the electrode gives a true representation of the beaker contents.

Calibration solutions with values near the expected sample value should be chosen. Only fresh calibration solutions should be used. Changing all solutions daily is a good practice. All solutions should be maintained at equal temperature.

Rinse the electrode twice between measurements: first thoroughly in distilled water and then with a small amount of the next sample to be measured. Allow the electrodes sufficient time to stabilise while calibrating or measuring. A stability indicator on all of our meters prompts the user when readings should be taken.

● About B, N, T, X, Y

Our electrodes have different options indicated with a suffix. Here is an explanation of the different suffixes:

- B** 1m cable
1 BNC connection
- N** 1m cable
2 banana connections
- T** built-in ATC (Pt1000)
1m cable
1 BNC connection
2 banana connections for ATC
- X** S7 screw connection (separate cable (SCxxB) needed)
- Y** S8 screw head for in-line use, screw connection (separate cable (SCxxB) needed)

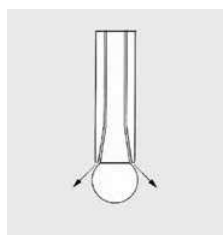
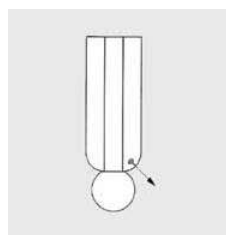
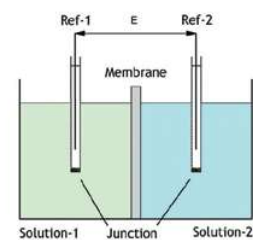
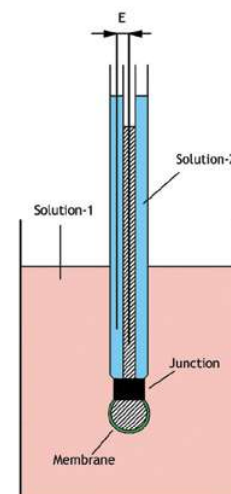
Application	SP10	SP11	SP20	SP21	SP22	SP24	SP26	SP27	SP28	SP29	SO50	SO60	SO65
Agar						•	•						
Agriculture	•	•	•	•									
Alkaline solutions					•								
Beer					•		•						
Blood			•	•			•		•				
Bread		•				•							
Cheese						•							
Cosmetics					•		•						
Cream					•		•						
Distilled water							•						
Dough		•				•							
Education	•	•	•	•							•	•	•
Emulsion							•						
Fat					•		•						
Field use	•	•									•		
Fruit			•	•	•	•		•					
Fish						•							
Glucose					•		•						
Honey							•						
Industrial, general		•									•		
Ink		•			•		•						
Juice			•	•	•								
Lab flasks, tall-form										•			
Laboratory, general		•	•	•	•							•	•
Lacquer					•		•						
Liquor					•		•						
Low ionic strength							•						
Meat						•							
Micro volume									•	•			
Milk					•		•						
Non-aqueous media							•						
Oil in water							•						
Paint					•		•						
Paper								•					
Photo bath					•		•						
Pure water		•	•	•	•		•						
Sausage						•							
Sea water	•	•	•	•	•						•	•	•
Soil	•	•	•	•		•							
Solvent in water					•		•						
Suspension							•						
Swimming pool	•	•	•	•	•						•	•	
Syrup							•						
Tap water		•	•	•	•							•	•
Temperature, high					•								
Test tube									•	•			
TRIS buffer					•		•						
Waste water		•			•		•					•	•
Wine					•		•						
Viscosity, high					•		•					•	
Yogurt					•		•					•	



SP11



SK27



● pH electrodes

Code	Body	Junction	Sealed	pH	°C	size	
SP10B SP10T	General	Epoxy	Single	yes	0...14	0...80	110xØ12
SP11B SP11T SP11X SP11Y	Rugged Tuff-Tip	Epoxy	Double	yes	0...14	0...100	110xØ12
SP20B SP20T	General	Glass	Single	yes	0...14	0...100	110xØ12
SP21B SP21T SP21X	General	Glass	Single	no	0...14	0...100	110xØ12
SP22X SP22Y	High Temp.	Glass	Double	yes	0...14	5...110	110xØ12
SP24B SP24X	Spear Tip	Ultem Glass	Double	yes	0...14	0...80	25xØ5
SP26X	Sleeve Junction	Glass	Double	no	0...14	0...100	110xØ12
SP27X	Flat Surface	Epoxy	Single	yes	0...14	0...80	110xØ12
SP28X	Micro Electrode	Glass	Single	no	0...14	0...80	130xØ4
SP29X	Test Tube	Glass	Single	no	0...14	0...100	250xØ8
SP9xY	Sterilisable max 10 bar	Glass	Double	yes	0...13	-5...135	
SP91Y: 110xØ12 mm		SP92Y: 120xØ12 mm		SP93Y: 130xØ12 mm			
SP94Y: 160xØ12 mm		SP95Y: 210xØ12 mm		SP97Y: 310xØ12 mm			
SP98Y: 360xØ12 mm							
→ add -KIT to order an electrode with 50ml pH4 and pH7 + 50ml 3M KCl							



● Special electrodes

Code	Body	°C	size		
SP04X	Titration	glass	double platinum	0...100	110xØ12
SP35B	pH/ORP combi	Glass	sealed 0...12 pH 0...±2000 mV single junction	0...100	110xØ12



● Glassless pH electrodes SP40

Our NEW Liquid pH or LpH sensor is specially designed so that there is no glass in contact with the solution being measured. Conventional glass pH electrodes are quickly etched and destroyed by HF and as a result, current glass pH electrodes for HF applications use an extra thick membrane causing slow sluggish response time. This is not the case with the SP40!

SP40 is an exact replacement for conventional glass pH electrodes. The SP40 is available in Laboratory 12mm design with double junction reference for extended probe life.

Specifications

pH Range	2 to 10
Temperature Range	0 to 40°C
Reproducibility	+/- 2 %
Zero Potential (E ₀)	7.00 pH
Slope (Span) 4 to 10 pH	>93% of Scale
Offset (Zero) at 7pH	0 mV +/- 30 mV
Membrane Resistance	<100 MΩ
Max Pressure	3 bar
Wetted Parts	Kynar®, Viton®, PVC, and Epoxy

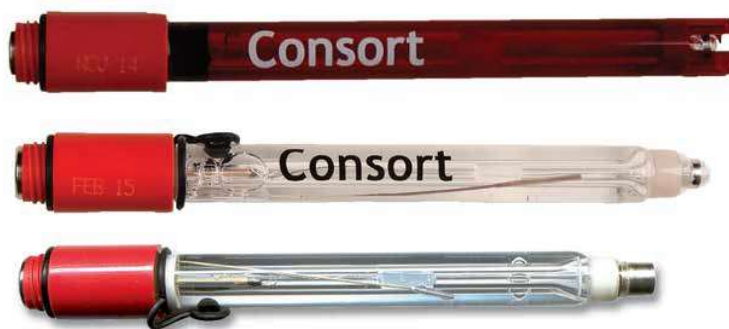


SP40X

Code	Description	Junction	pH	°C	size
SP40X	S7 LpH sensor	Double	2...10	0...40	110xØ12
SP40Y	S8 LpH sensor	Double	2...10	0...40	110xØ12

● ORP electrodes

Code	Body	Junction	Sealed	mV	°C	size	
SO50X SO50Y	Platinum	Epoxy	Single	yes	0...±2000	0...80	110xØ12
SO60X	Platinum	Glass	Single	no	0...±2000	0...100	110xØ12
SO65X	Silver	Glass	Single	no	0...±2000	0...100	110xØ12
SO70X	Gold	Glass	Single	no	0...±2000	0...100	110xØ12



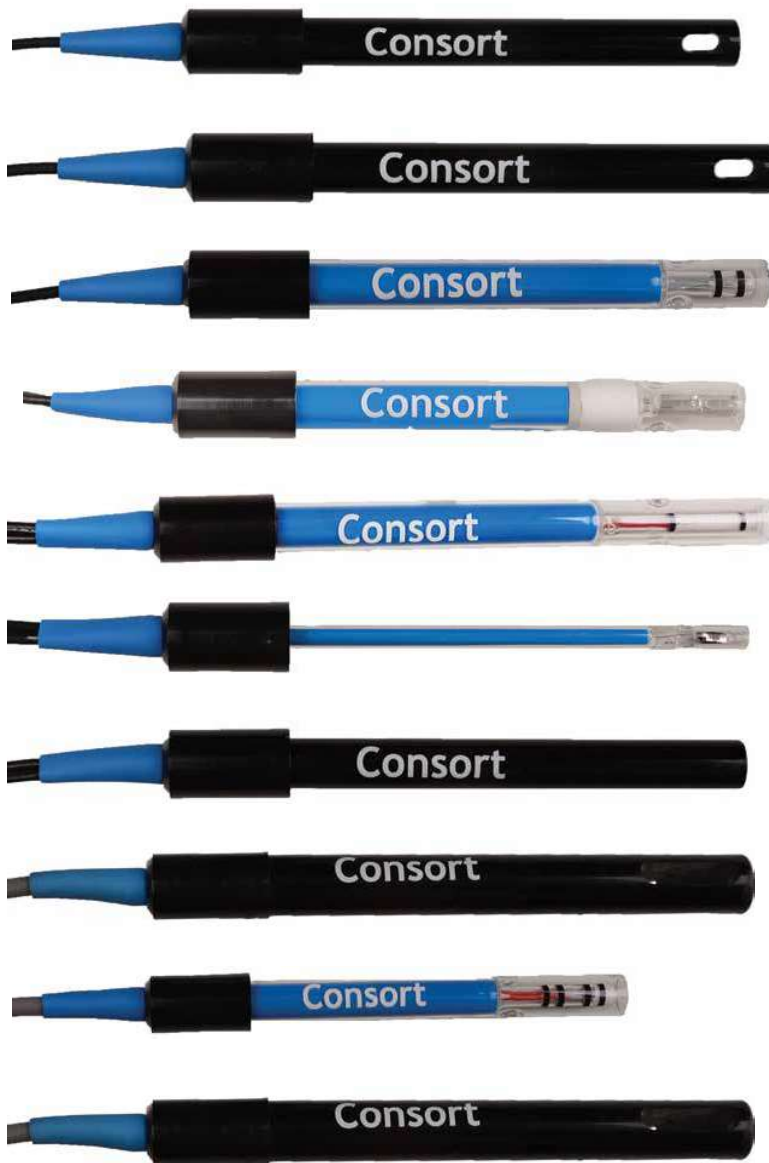
● Dissolved oxygen electrode

Code	Type	Body	mg/l	°C	size	
SZ10T	Galvanic	3m submersible cable	Delrin	0...60	0...50	110xØ12
SZ12T15	Galvanic	15m cable 2 BNC plugs S8 head	Delrin	0...60	0...50	110xØ12
SZ02K	Set of 3 membranes + electrolyte					



● Conductivity electrodes

Code	Body	Poles	CC	°C	size	
SK10B SK10T SK10Y	General Graphite	Epoxy	2	1 cm ⁻¹	0...80	110xØ12
SK12T	Low cond. Graphite	Epoxy	2	0.1 cm ⁻¹	0...80	110xØ12
SK20B SK20T SK20Y	General Platinum	Glass	2	1 cm ⁻¹	0...110	110xØ12
SK21T SK21Y	Low cond. Platinum	Glass	2	0.1 cm ⁻¹	0...110	110xØ12
SK23T	High cond. Platinum	Glass	2	10 cm ⁻¹	0...110	130xØ12
SK24T	Micro elec. Platinum	Glass	2	1 cm ⁻¹	0...100	110xØ6
SK27B SK27T	Flat Surface Graphite	Epoxy	2	1 cm ⁻¹	0...80	110xØ12
SK40T	4-pole Graphite	Epoxy	4	0.5 cm ⁻¹	0...80	110xØ15
SK41T	4-pole Platinum	Glass	4	1 cm ⁻¹	0...100	110xØ12
SK43T	4-pole High cond. Platinum	Glass	4	10 cm ⁻¹	0...100	110xØ12



● Temperature Compensator

Code	Body	type	°C	size
ST10N	Teflon coated stainless steel	Pt1000	-30...+130	110xØ4
ST20N	Glass	Pt1000	-30...+130	110xØ8
ST21Y	Glass	Pt1000	-30...+130	110x12



Polymer electrodes consist of various ion-exchange materials in an inert matrix such as PVC, polythene or silicone rubber.

Solid state electrodes utilise relatively insoluble inorganic salts in a membrane.

Glass membrane electrodes are formed by the doping of the silicon dioxide glass matrix with various chemicals.

Two versions available:

- Sealed (ISE20B...ISE37B)

Gas sensing electrodes are available for the measurement of ammonia, carbon dioxides and nitrogen oxides. These electrodes have a gas permeable membrane and an internal filling solution.

One versions available:

- Flat replaceable membrane (ISE50B...ISE52B)

All models are combination electrodes and have an epoxy body.

Dimensions: **110xØ12 mm**



MODEL	ION	SENSOR	RANGE (M)	RANGE (ppm)	°C	INTERFERENCES	pH	ELECTROLYTE
ISE20B	Ammonium NH ₄ ⁺	polymer	5.10 ⁻⁶ - 10 ⁰	0.1 - 18000	0 - 50	K ⁺	4 - 10	NaCl
ISE21B	Bromide Br ⁻	solid state	5.10 ⁻⁶ - 10 ⁰	0.4 - 79900	0 - 50	I ⁻ , CN ⁻ , S ²⁻ , high levels of Cl ⁻ and NH ₃	2 - 14	KNO ₃
ISE22B	Cadmium Cd ²⁺	solid state	10 ⁻⁷ - 10 ⁻¹	0.01 - 11200	0 - 50	Cu ²⁺ , Hg ²⁺ , Ag ⁺ , high levels of Fe ²⁺ and Pb ²⁺	2 - 12	KNO ₃
ISE23B	Calcium Ca ²⁺	polymer	5.10 ⁻⁶ - 10 ⁰	0.2 - 40000	0 - 50	Pb ²⁺ , Hg ²⁺ , Cu ²⁺ , Ni ²⁺	3 - 10	KCl
ISE24B	Chloride Cl ⁻	solid state	5.10 ⁻⁵ - 10 ⁰	1.8 - 35500	0 - 50	I ⁻ , Br ⁻ , CN ⁻ , S ²⁻	1 - 12	KNO ₃
ISE25B	Copper Cu ²⁺	solid state	10 ⁻⁸ - 10 ⁻¹	0.00064 - 6350	0 - 50	Hg ²⁺ , Ag ⁺ , high levels of Cl ⁻ , Br ⁻ , Fe ²⁺ and Cd ²⁺	2 - 12	KNO ₃
ISE26B	Cyanide CN ⁻	solid state	5.10 ⁻⁶ - 10 ⁻²	0.13 - 260	0 - 50	Cl ⁻ , Br ⁻ , I ⁻ , S ²⁻	11 - 13	KNO ₃
ISE27B	Fluoride F ⁻	solid state	10 ⁻⁶ - sat.	0.02 - sat.	0 - 50	OH ⁻	5 - 8	KCl
ISE28B	Fluoroborate BF ₄ ⁻	polymer	7.10 ⁻⁶ - 10 ⁰	0.1 - 10800	0 - 50	I ⁻ , ClO ₄ ⁻ , CN ⁻	2.5 - 11	(NH ₄) ₂ SO ₄
ISE29B	Iodide I ⁻	solid state	5.10 ⁻⁸ - 10 ⁰	0.006 - 127000	0 - 50	S ²⁻ , CN ⁻ , Cl ⁻ , Br ⁻ , S ₂ O ₃ ²⁻ , NH ₃	0 - 14	KNO ₃
ISE30B	Lead Pb ²⁺	solid state	10 ⁻⁶ - 10 ⁻¹	0.2 - 20700	0 - 50	Hg ²⁺ , Ag ⁺ , Cu ²⁺ , high levels of Fe ²⁺ and Cd ²⁺	3 - 8	KNO ₃
ISE31B	Nitrate NO ₃ ⁻	polymer	7.10 ⁻⁶ - 10 ⁰	0.5 - 62000	0 - 50	I ⁻ , ClO ₄ ⁻ , CN ⁻ , BF ₄ ⁻	2.5 - 11	(NH ₄) ₂ SO ₄
ISE32B	Perchlorate ClO ₄ ⁻	polymer	7.10 ⁻⁶ - 10 ⁰	0.7 - 99500	0 - 50	-	2.5 - 11	(NH ₄) ₂ SO ₄
ISE33B	Potassium K ⁺	polymer	10 ⁻⁶ - 10 ⁰	0.04 - 39000	0 - 50	Cs ⁺ , NH ₄ ⁺	2 - 12	NaCl
ISE34B	Silver/Sulphide Ag ⁺ /S ²⁻	solid state	10 ⁻⁷ - 10 ⁰	0.01 - 107900 0.003 - 32000	0 - 50	Hg ⁺ , Hg ²⁺	2 - 12	KNO ₃
ISE35B	Sodium Na ⁺	glass	10 ⁻⁶ - sat.	0.02 - sat.	0 - 50	H ⁺ , K ⁺ , Li ⁺ , Ag ⁺ , Cs ⁺ , Tl ⁺	5 - 12	NH ₄ Cl
ISE36B	Surfactant X ⁻ /X ⁻	polymer	10 ⁻⁵ - 5.10 ⁻²	1 - 12000	0 - 50	similar types of surfactants	2 - 12	KCl
ISE37B	Water hardness Ca ²⁺ /Mg ²⁺	polymer	10 ⁻⁵ - 10 ⁰	0.4 - 4000 (Ca ²⁺)	0 - 50	Cu ²⁺ , Zn ²⁺ , Ni ²⁺ , Fe ²⁺	5 - 10	KCl
ISE50B	Ammonia NH ₃	gas sensing	5.10 ⁻⁷ - 10 ⁰	0.01 - 17000	0 - 50	volatile amines	11 - 13	NH ₄ Cl
ISE51B	Carbon dioxide CO ₂ /CO ₃ ²⁻	gas sensing	10 ⁻⁴ - 10 ⁻²	4.4 - 440	0 - 50	volatile weak acids	4.8 - 5.2	NaHCO ₃
ISE52B	Nitrogen oxides NO _x	gas sensing	5.10 ⁻⁶ - 5.10 ⁻³	0.2 - 220	0 - 50	SO ₂ , HF, acetic acid	1.1 - 1.7	NaNO ₂

● pH Solutions

Code	Description	
B002	Coloured buffer 2 pH	50 ml
B004	Coloured buffer 4 pH	50 ml
B007	Coloured buffer 7 pH	50 ml
B010	Coloured buffer 10 pH	50 ml
B012	Coloured buffer 12 pH	50 ml
B502	Coloured buffer 2 pH	500 ml
B504	Coloured buffer 4 pH	500 ml
B507	Coloured buffer 7 pH	500 ml
B510	Coloured buffer 10 pH	500 ml
B512	Coloured buffer 12 pH	500 ml
B520	Electrolyte, 3M KCl	500 ml
B530	Electrode cleaning solution	500 ml



Colour coded to reduce errors
Certified to 0.02 pH

● ORP Solutions

Code	Description	
B071	Redox standard solution 124 mV	50 ml
B072	Redox standard solution 358 mV	50 ml
B571	Redox standard solution 124 mV	500 ml
B572	Redox standard solution 358 mV	500 ml
B520	Electrolyte, 3M KCl	500 ml
B530	Electrode cleaning solution	500 ml



Certified to 1 mV at 25°C.

● Conductivity Solutions

Code	Description	
B060	Calibration solution 0.01 M KCl (1413 µS/cm at 25°C)	50 ml
B061	Calibration solution 0.1 M KCl (12.88 mS/cm at 25°C)	50 ml
B062	Calibration solution 1 M KCl (111.8 mS/cm at 25°C)	50 ml
B066	Calibration solution 200 mS/cm (at 25°C)	50 ml
B560	Calibration solution 0.01 M KCl (1413 µS/cm at 25°C)	500 ml
B561	Calibration solution 0.1 M KCl (12.88 mS/cm at 25°C)	500 ml
B562	Calibration solution 1 M KCl (111.8 mS/cm at 25°C)	500 ml
B566B	Calibration solution 200 mS/cm (at 25°C)	500 ml



Certified to 0.5%

● ISE Solutions

Code	Description	
ISC20	Calibration solution, 1000 ppm ammonium	475 ml
ISC21	Calibration solution, 1000 ppm bromide	475 ml
ISC23	Calibration solution, 1000 ppm calcium	475 ml
ISC24	Calibration solution, 1000 ppm chloride	475 ml
ISC25	Calibration solution, 1000 ppm copper	475 ml
ISC27	Calibration solution, 1000 ppm fluoride	475 ml
ISC28	Calibration solution, 1000 ppm fluoroborate	475 ml
ISC29	Calibration solution, 1000 ppm iodide	475 ml
ISC31	Calibration solution, 1000 ppm nitrate	475 ml
ISC32	Calibration solution, 1000 ppm perchlorate	475 ml
ISC33	Calibration solution, 1000 ppm potassium	475 ml
ISC34	Calibration solution, 1000 ppm silver/sulphide	475 ml
ISC35	Calibration solution, 1000 ppm sodium	475 ml
ISC37	Calibration solution, 1000 ppm water hardness	475 ml
ISC50	Calibration solution, 1000 ppm ammonia	475 ml
ISC51	Calibration solution, 1000 ppm carbon dioxides	475 ml

→ Other solutions should be prepared locally.

Code	Description	
ISA20	ISA solution for ammonium, potassium	475 ml
ISA21	ISA solution for bromide	475 ml
ISA22	ISA solution for cadmium	475 ml
ISA23	ISA solution for calcium	475 ml
ISA24	ISA solution for chloride	475 ml
ISA25	ISA solution for copper	475 ml
ISA27A	ISA solution for fluoride, TISAB-1	475 ml
ISA27B	ISA solution for fluoride, TISAB-2	475 ml
ISA27C	ISA solution for fluoride, TISAB-3	475 ml
ISA28	ISA solution for fluoroborate	475 ml
ISA29	ISA solution for iodide	475 ml
ISA30	ISA solution for lead	475 ml
ISA31	ISA solution for nitrate	475 ml
ISA32	ISA solution for perchlorate	475 ml
ISA33	ISA solution for potassium	475 ml
ISA34	ISA solution for silver/sulphide	475 ml
ISA35	ISA solution for sodium	475 ml
ISA37	ISA solution for water hardness	475 ml
ISA51	ISA solution for carbon dioxides	475 ml
ISA52	ISA solution for nitrogen oxides	475 ml

→ Other solutions should be prepared locally.

● Electrode cables and adaptors

Code	Description
SC01B	S7/S8 cable, 1 m, with BNC plug
SC03B	S7/S8 cable, 3 m, with BNC plug
SC06B	S7/S8 cable, 6 m, with BNC plug
SC15B	S7/S8 cable, 15 m, with BNC plug
SC30B	S7/S8 cable, 30 m, with BNC plug
ADAPT-BNC-DIN	Adaptor, BNC to DIN socket
ADAPT-BNC-BANANA	Adaptor, BNC to 2 banana
BOTTLE-ELECTRODE	Storage bottle for electrodes, 8 ml
→ Other lengths or plugs on demand	



AP414

Thermal printer



Serial (RS232) and parallel (Centronix) input.
 Thermal dot matrix 9x320 dots.
 Prints 40 columns (normal) or 80 columns (condensed).
 Paper width: 112 mm.
 Roll length: ±28 m.

Supplied with manual, 1 roll of thermal paper, mains adaptor (230 VAC) and RS232 cable. Optional rechargeable battery pack.

Code	Description
AP414	Serial printer + mains adaptor + RS232 cable
AM112	Replacement paper, 112 mm x 25 m
AP4005	Rechargeable battery pack (optional)

SH300

Electrode holder



Model SH300 holds up to three standard electrodes. Its heavy base and very stable flexible arm allow the electrodes to move sideways or up and down while keeping them at a constant vertical angle.

Code	Description
SH300	Flexible electrode holder

Why is a double junction electrode better than a single junction electrode?

A double junction electrode is less likely to become clogged because the second junction is located higher up in the probe out of contact with the sample. It is also less sensitive to pollution as the first reference solution chamber is isolated from the measurement solution by means of a second chamber that acts as a salt bridge.

How often do I need to calibrate my pH meter?

This depends on the type of products being measured, the maintenance and the required accuracy. It may be weekly, daily or before each use or set of uses.

How far can my pH electrode be from my meter? What if it is too far?

The maximum distance an electrode can be from a pH meter is about 15 m, sometimes more and depends on the environment where it is placed. If the distance is greater, you will need a transmitter. Use either a transmitter or purchase an industrial electrode with a built-in transmitter. A transmitter will allow you to use your electrode up to 300 m from your meter provided you are not in a noisy environment.

If measuring the entire range of pH what buffers should be used?

At least 3 buffers, e.g. pH 4, 7 and 10.

What pH electrode do I use for a specific application?

Follow the general rules below for selecting the right pH electrode:

Glass bodied pH electrodes may be used in most sample types.

Epoxy bodied pH electrodes are designed for rugged environments, multiple-user situations, and field or plant applications. Epoxy bodied pH electrodes should not be used in organic solvents.

For situations containing proteins, sulphide, and TRIS, use double junction electrodes.

For viscous or dirty samples, use sleeve junction electrodes for best results and easy cleaning.

Do pH buffers and filling solutions have a shelf-life?

The typical shelf-life for pH buffers and filling solutions is 2 years unopened and 6 months open. For best results, the pH buffer bottles should be sealed promptly to avoid carbon dioxide absorption.

What is a good pH electrode slope range?

The acceptable slope range is 92% to 102%. Slopes below 92% indicate that the electrode may require cleaning or if cleaning does not help, the electrode should be replaced. Slopes above 102% indicate that the pH buffers are contaminated.

What is a good pH electrode ISO-pH range?

The acceptable slope range is 6.5 to 7.5 pH. Values outside this range indicate that the electrode may require cleaning or if cleaning does not help, the electrode should be replaced.

Do I need an Automatic Temperature Compensation (ATC) probe?

The most common cause of error in pH measurements is temperature. The slope of a pH electrode is highly dependent of temperature, and pH buffer values and sample values change with temperature. For the most accurate results an ATC probe is always recommended. There are three advantages for using an ATC probe. The meter recognises a particular pH buffer and autocalibrates with the correct pH value at the current temperature. The meter calculates and stores the correct slope value. The meter automatically adjusts the stored slope in memory to display the temperature adjusted pH value of the sample.

What is the best absolute accuracy I can achieve?

Measuring errors depend on the electronic accuracy of the meter (generally 0.01 pH), the accuracy of the two buffers (generally 0.02 pH) and the chemical behaviour of the electrode. This results in an error of minimum 0.05 pH provided the solutions are stirred. It is better to consider 0.1 pH as the best possible absolute accuracy. In extreme situations like measuring very low or high pH measurements, difficult solutions, or temperatures far from room temperature will increase the errors.

Why will my pH system no longer autocalibrate?

When the pH system will not autocalibrate, the meter, pH electrode and pH buffers should be checked systematically. If your meter has a mV mode, measure the electrode mV in pH buffers:

- The electrode mV in a pH 7 buffer should be 0 ± 30 mV.
- The electrode mV in a pH 4 buffer (at 25°C) should be 160 to 180 mV more than the value in pH 7.
- The electrode mV in a pH 10 buffer (at 25°C) should be 160 to 180 mV less than the value in pH 7.

If the mV values are outside of the above ranges, clean the pH electrode. If cleaning does not return the mV to an acceptable range, replace the electrode. Note: as long as the pH electrode has a slope between 92% and 102%, the electrode should be working properly. The pH buffers should be replaced if the measured mV values are outside of the acceptable ranges. Contaminated buffers may slightly contribute to shifted mV values.

My pH electrode is drifting. What should I do?

There are three possible causes for electrode drift:

If the electrode is new (or has been dry) and drifting, the electrode may not be properly conditioned. Refer to the appropriate electrode instruction manual for details.

If the electrode is stable in buffers but not in the sample, the electrode may be incompatible with the sample or application.

If the electrode is drifting in buffers and samples, the electrode may require cleaning.