

Consort

Artistic in science



20-06

Product catalogue

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)

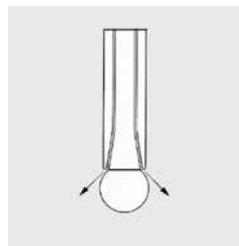
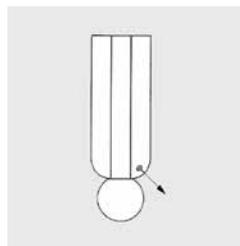
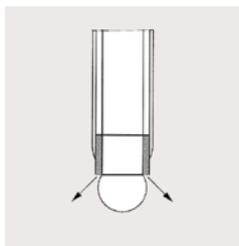
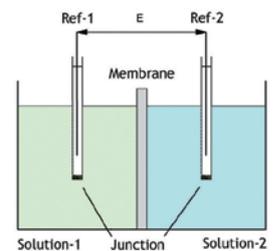
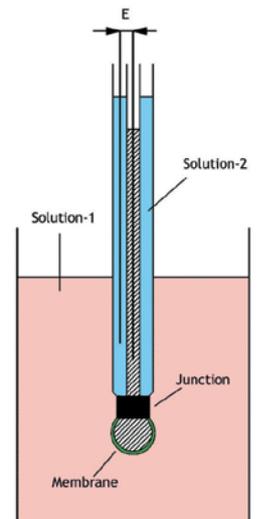
Application	SP10	SP11	SP20	SP21	SP22	SP24	SP26	SP27	SP28	SP29	SO50	SO60	SO65
Agar						•	•						
Agriculture	•	•	•	•									
Alkaline solutions					•								
Beer					•		•						
Blood			•	•			•		•				
Bread		•				•							
Cheese						•							
Cosmetics					•		•						
Cream					•		•						
Distilled water							•						
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/ORP/DO electrodes

● 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 (Eo)	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

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



SP40X

● 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



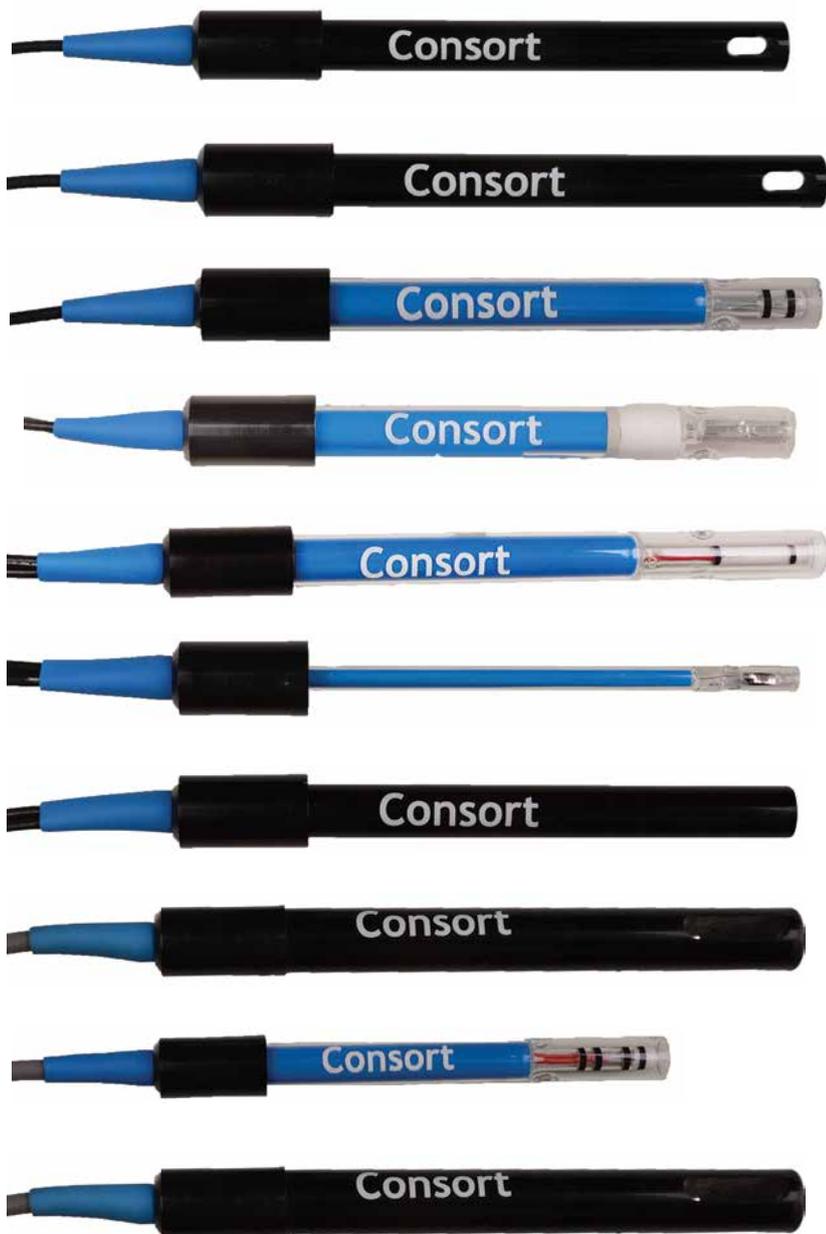
● Dissolved oxygen electrode

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 week 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.

ABSOLUTE READINGS

The instrument shows the actual value without compensating to a reference temperature.

AC-ADAPTOR

An internationally approved mains-plug with built-in low voltage transformer for a safe supply of energy to instruments.

ACCURACY

Maximum electronic error of the measured unit. The accuracy of an electrochemical determination such as pH, conductivity, dissolved oxygen & ion-selective measurements is mainly limited by the electrodes and calibration solutions.

ALARM

An alert sounds or a relay is closed when readings stray outside pre-set limits.

ALTERNATING DISPLAY

The meter can automatically scan all selected inputs for display or transmission to a computer or printer.

AUTOMATIC CROSS-OVER

When the resistance of an electrophoresis apparatus changes during a run, the power supply is able to switch automatically between constant voltage, constant current and constant power.

BATTERY CAPACITY

Percentage of remaining battery capacity.

BAUD RATE

Communication speed, in bits/second (b/s), of the digital interface (RS232).

BUFFER

A solution of buffered species where the pH tends to remain constant if diluted or concentrated.

Pre-programmed pH buffers: 1.68/ 2.00/ 4.00/ 4.01/ 6.87/ 7.00/ 9.18/ 9.21/ 10.01/ 12.00/ 12.45.

User specified pH buffers: special tables can be stored for future calibrations.

CALIBRATION REMINDER

A timed calibration procedure facilitates considerably GLP management by prompting the user when his instrument needs to be recalibrated.

CAPACITIVE COMPENSATION

The capacity of the electrode and its cable falsifies the measurement at very low conductivities. A capacity compensation allows to compensate for these errors.

CELL

The 2-pole design is the most commonly used conductivity cell. The electrodes are made of platinised platinum. The cell must be replaced or re-platinised if the plates become fouled.

The 4-pole design reduces considerably the problems of polarisation and fouling. By utilising four electrodes, no current flows through the measuring circuit. The AC-current is only applied to the outer pair of rings allowing the inner pair of electrodes to measure the voltage without any polarisation effects.

CELL CONSTANT

The cell constant (cm⁻¹) of a conductivity electrode is determined by the length (cm) of the column of liquid between the plates divided by the area (cm²) of the plates.

CONCENTRATION

Concentration measurement with an ion selective electrode requires a minimum of chemical know-how to make successful ion selective determinations.

CONDUCTIVITY

The conductivity is a measure of the solution's ability to conduct electric current. The basic unit is Siemens/cm (S/cm). It is measured by an electrode consisting of two platinum plates to which an alternating potential is applied. The corresponding current is proportional to the conductivity of the ionic solution in which the electrode is dipped.

DATA-ACQUISITION

Connect the instrument to a computer via an USB, RS232, RS485 interface for bi-directional communication capabilities. Most instruments require no special software and feature an advanced easy to use data acquisition fully compatible with spread-sheet.

DATA-LOGGING

Stores automatically or manually the measured values (+ °C & time/date) in a built-in non-volatile memory.

GLP

Good Laboratory Practices procedures help to increase accuracy through calibration reports.

GROUND LEAKAGE

Leaking or dirty electrophoresis apparatus are dangerous, since the applied high voltage may result in an electric current flowing through the operator to the ground.

IDENTIFICATION NUMBER

Several instruments connected to the same computer can easily be identified when specific numbers are allocated to them.

INPUT

Several types of connectors are used according to the application. Check the specifications of meter-input and electrode-plug on their compatibility.

ISO-pH

Zero-point of a pH electrode. A new pH electrode has an ISO-pH between 6.5

and 7.5 pH.

MINIMUM/MAXIMUM MEMORY

Recalls the lowest/highest values ever measured since the last calibration.

mV

Electrode potential is read in mV.

ON/OFF CONTROL

Simple control system in which the relays are continuously closed when a pre-set level is exceeded.

ORP

Oxido-Reduction-Potential (the reducing or oxidising capability of a solution).

PASSWORD PROTECTION

For tamper-proof storage of parameters and data, a secret personal code protects the instrument against any undesired access.

pH

The pH is a measurement for the acidity or alkalinity of a solution. In pure water the hydrogen ion (H⁺) and hydroxyl ion (OH⁻) concentrations are equal at 10⁻⁷ M (25°C). To provide a convenient and effective means of defining acidity and alkalinity, the negative logarithm of hydrogen ion activity is used. The pH is calculated from the potential between a glass and a reference electrode (Nernst equation).

PROPORTIONAL CONTROL

The control relay will pulse at a rate proportional to the regulation difference. When the difference is superior to a pre-set maximum value, the relay is continuously activated. However, when reaching a pre-set level the wait-time between the pulses will increase gradually in order to perform very accurate regulations.

Pt100

Platinum resistance thermometer (100 Ω at 0°C). It requires a low resistance cable for highest accuracy.

Pt1000

Platinum resistance thermometer (1000 Ω at 0°C). Less errors when using longer cables.

QUALITY MANAGEMENT

Measuring equipment should be calibrated on a regular basis (GLP). The accuracy of measurements is only limited by the electrodes and calibration solutions. At any moment, a complete documentation about the electrodes and calibration solutions can be printed or sent to a computer. This includes meter settings, data about the last calibration and a comparison with the previous calibration. The use of certified calibration solutions is strongly recommended. For very accurate quality measurements fresh standard solutions should be used for each calibration.

QUANTIFICATION OF VINCENT

The quantification of Vincent is a measurement for the energy stored in an organism. It expresses the maximum dissipation of energy by a chemical or biochemical reaction. The basic unit is Watt (W) but it is more convenient to use μW (micro-watt). It is calculated from the ORP, referenced against a hydrogen electrode, and the resistance.

RANGE LOCK

Allows to lock the initial conductivity measuring range when titrating in order to avoid cross-over errors due to varying measuring frequencies and linearity errors of the conductivity cell.

REAL TIME CLOCK

Shows time and date on the display.

REDOX POTENTIAL

The potential developed by a metallic electrode when placed in a solution containing a species in two different oxidation states. It is usually measured by a combination platinum electrode.

REFERENCE TEMPERATURE

Conductivity measurements are temperature dependent. Therefore, the readings should be referenced to a standard temperature.

RESISTIVITY

Electrical resistivity is the reciprocal of Conductivity. The basic unit is Ohm.cm ($\Omega\cdot\text{cm}$). While the ion concentration of a solution decreases, the resistivity rises up to a maximum of $18.3\text{ M}\Omega\cdot\text{cm}$ (absolute pure water at 25°C).

RESOLUTION

Smallest possible reading of the measured unit. More sophisticated meters allow to select the desired resolution. Unlike other meters, the CONSORT models round off the last digit rather than simply truncating digits outside the display range.

rH2

The rH2 is a measurement for the level of electronic exchanges between water and dissolved ions. It enables to study incomplete, indeterminate and very diluted aqueous redox solutions. It is defined as the negative logarithm of molecular hydrogen ion activity, calculated from the pH and the ORP referenced against a hydrogen electrode.

RS232

Digital interface, transmits the displayed values and calibration data to a printer or computer.

RS485

Allows to connect several process controllers for bi-directional communication with a computer. It allows multiple devices (up to 32) to communicate at half-duplex on a single

pair of wires, plus a ground wire, at distances up to 1200 meters.

SALINITY

Salinity gives an indication of the salt content of sea water. It is calculated from the conductivity referred to 15°C . The salinity is the ratio between the total salt content (g) and the total weight of the sea water (kg). Hence salinity can be expressed in ppt (parts per thousand).

SLOPE

Percentage which relates the actual behaviour of a pH electrode to the Nernst's law. A new electrode has a slope between 95 and 100 %.

S/S RELAY

A solid-state relay contains no mechanical contacts. Long life, compact design and spark-free switching are its main advantages. It should not be used for controlling very low power loads, as the small leakage current can cause unwanted switching-on.

STABILITY INDICATION

A decimal point flashes until the electrode output remains constant, then readings can be recorded.

TDS

Total Dissolved Salts of a solution gives an indication of the total ion concentration. Due to ionic interactions within a solution, the salt concentration cannot easily be related to conductivity. As the dissolved solids are generally unknown, a TDS measurement is always referred to a solution of pure Sodium Chloride.

TEMPERATURE COEFFICIENT

Each solution has its own temperature coefficient ($\%/K$). As this coefficient also varies with temperature, a standard conductometer cannot achieve a precise temperature compensation over a wide span of temperatures. However, a research grade meter is able to plot special temperature curves for each individual type of solutions in its non-volatile memory. Specific temperature coefficients can also be entered for special applications. For standard applications, the non-linear function for natural waters (EN27888) is used.

TEMPERATURE COMPENSATION

Corrects readings for variations in electrode response due to temperature effects.

THERMOCOUPLE

Thermocouples basically consist of two dissimilar wires (each made of a different alloy). One end is twisted or soldered to form a measuring junction. The other end is connected to a thermometer and forms the reference junction. The signal is a small voltage (μV) proportional to the temperature

gradient between the measuring and reference junctions. Thermocouple probes are ideal to cover greater lengths. They also have a great temperature range and can easily pass through e.g. oven doors. Response time is faster than with Pt100 probes. Accuracy, stability and repeatability are less than with Pt100 probes.

USB

Universal Serial Bus is a standard designed to eliminate the guesswork in connecting peripherals to a computer.

VOLT-HOUR INTEGRATOR

The distance at which molecules migrate in an electrophoresis apparatus depends on the applied voltage and run-time ($\int V\cdot dt$). In order to achieve reproducible experiments, it is recommended to use a volt-hour integrator rather than a simple timer.

ZERO POINT (E_0)

Standard pH meters assume a pH electrode to supply a zero potential at 7 pH. Electrodes for special applications (e.g. stomach pH measurements) may have a different zero point. An adjustable zero point correction feature will allow users to measure with these electrodes.

Art. 1

Unless otherwise agreed in writing, the legal relationship between the parties is governed by the present general terms, of which the customer declares to have taken cognisance, and which prevail over the customer's possible terms of purchase.

Art. 2

All quotations are without engagement. Prices do not include taxes. Any price stated is based at all times on the salaries, social charges and prices of materials obtaining on the date of the quotation. Official price modifications as arranged by legal dispositions automatically entail equivalent modifications of the prices stated in the contract. This proportional increase can also apply to part of the order or work.

Art. 3

Transport or dispatch of our goods by any means of transport is at the consignee's risk, even with carriage paid.

Art. 4

If our firm acts as an intermediary, the guarantee on the goods supplied by us is restricted to the guarantee given to us by the supplier or manufacturer. If the goods are subject to formal guarantee, defective, material will be repaired or replaced, but no claims for any other damage will be accepted.

Art. 5

All invoices are payable cash on the address of the invoice unless otherwise stipulated in the documents committing the parties or unless an expiry date is stated on the Invoice.

Art. 6

Contrary to art. 1583 of the Civil Code, any goods that are not paid in full remain our full property; in such case possible advance payments will serve as a compensation for costs and loss of profit.

Art. 7

Bills in arrears entitle us to suspend any further deliveries or services without prior notice, such to prevent debts from further increasing.

Art. 8

The supply of goods or services on a later date than the date stipulated for supply or service, if such is not caused by bad faith or a serious shortcoming of the supplier, shall never form a motive for suspending the order or the agreement, nor entitle the customer to claim any damages.

Art. 9

If default is made in cash payment or if payment is not carried out on the expiry date stated, the amount of the invoice shall bear a conventional interest of 1.5% per month as from the day on which the invoice is remitted or as from the expiry date stated, such by right and without any formal notice. Each month started shall be charged as a full month.

Art. 10

Moreover, by way of a fixed and irrevocable condition, the amount of the invoice shall be increased by 15% with a minimum of 200 EUR, by right and without formal notice, as a compensation for recovery costs of the claim (both staff and administration costs, management and follow-up of the file, influences on financial management, etc.), in application of art. 1147 C.C. and 1152 C.C. This compensation is due apart from the moratory interests, the recoverable procedure costs and the possible compensation for material damages and loss of profit. The parties thus agree that this compensation is fixed and that, contrary to art. 1231 C.C. It cannot be modified, even when the shortcoming is only partial.

Art. 11

Cheques and bills of exchange are only accepted as payment after their repayment. Possible costs are at the expense of the purchaser or commissioner.

Art. 12

The drawing and/or accepting bills of exchange or other transferable documents does not imply a novation or deviation from the general terms. The acceptance costs of bills of exchange are at the expense of the purchaser or commissioner.

Art. 13

If one invoice remains unpaid on its expiry date, the balance due of any other invoices, even when not expired, are immediately recoverable by right.

Art. 14

In the event of a dispute, only the courts of Turnhout, Belgium, shall have competence.

Art. 15

Any complaints regarding the supply of the goods and services shall be made on termination and be confirmed by a motivated registered letter within 8 days of the date of supply. These complaints do not suspend the obligation of payment.

Art. 16

Remarks and restrictions concerning the invoice and/or the general terms therein stated shall be transmitted to us by motivated registered letter within 8 days of date of invoice; for the settlement of disputes this period amounts to 30 days. If an order form is signed by a purchaser or commissioner, the regulations of the general terms stated on the order form shall apply.