

Electrode types

pH electrodes



A



B



C



D



E



F



G

- **Membrane types**

Each membrane of a pH electrode has its own composition, bulb configuration and thickness. Therefore, carefully study the specifications and suggestions in this section to select the most suitable electrode for your application.

A Spheric bulb, brittle, rapid response, highest accuracy, standard applications.

B This new green glass bulb is perfect in low ionic strength solutions as well as for high pH applications and has fast response time with superior accuracy and repeatability.

C Spear bulb, fairly robust, slower response, less accurate, suitable for semi-solids.

D Micro bulb, very brittle, slow response, less accurate, for small volumes of high ionic solutions.

E Flat surface bulb, robust, slower response, less accurate, easily cleaned.

- **Electrode construction**

Glass body electrodes are ideal for accuracy, high temperature and ease of cleaning.

Epoxy body electrodes are a good choice for applications where rough handling and breakage are a major problem.

- **Quality electrodes**

Use this series of electrodes for high performance laboratory measurements according to the GLP requirements. Supplied without cable, they are the ideal choice to match a variety of interchangeable cables.

F Plug head, accepts S7/S8 cables up to 30 m long.

Industrial electrodes are supplied with a standard S8 screw cap. The outer thread size is Pg13.5 for easy in-line mounting.

G Screw cap, accepts S7/S8 cables up to 30 m long.

- **Refillable reference**

Selected for high accuracy, stability and longer electrode life, refillable types sacrifice convenience and ease of maintenance.

- **Sealed reference**

Sealed gel filled reference electrodes are designed for convenience where minimal maintenance is required. Slightly lower accuracy and shorter life must be taken in account.

- **Double junction**

A double junction reference is constructed with an Ag/AgCl inner chamber and a chemically compatible reference solution in the outer chamber.

It is recommended for samples containing organic compounds, proteins, heavy metals and other compounds that interact with silver, such as bromides, iodides, cyanides and sulphides.

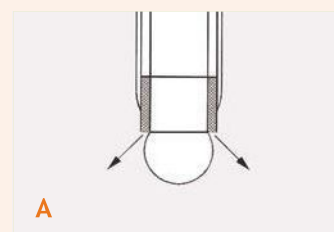
- **Junction types**

The slower flowing junctions provide less contamination but are more easily clogged than the fast flowing junctions.

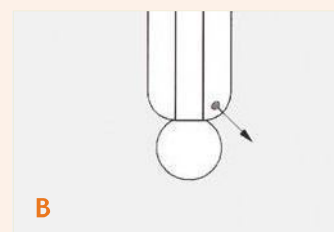
A Most glass combination electrodes feature an anti-fouling annular ceramic junction. The annular junction (medium flow rate) is formulated with a special ceramic which encircles the glass bulb. Numerous pores in the ceramic provide lower resistance and more stable readings.

B The epoxy, polymer and some glass combination electrodes come standard with one or more specially formulated porous ceramic or fibre junction plugs.

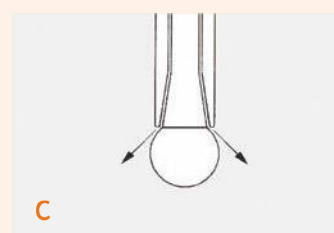
C Sleeve junctions provide the highest flow rate for difficult samples. An open junction brings the internal electrolyte in direct contact with the samples.



A



B



C

Application guide													pH and ORP electrodes	
Application	SP10	SP11	SP21	SP22	SP23	SP24	SP26	SP27	SP28	SP29	SP50	SP60	SP61	SP65
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				•	•		•					•		

ELECTRODE TYPES

- SP pH, ORP or metal electrode
- SK conductivity electrode
- SZ dissolved oxygen electrode
- ISE ion selective electrode

ELECTRODE VERSIONS

- B combination electrode with cable and BNC plug
- T combination electrode with built-in ATC, cable and plugs
- X combination electrode with S7 screw cap, without cable
- Y combination electrode with S8 screw cap, without cable

Standard pH electrodes

supplied with 1 m of cable and BNC plug (+ 2 banana plugs for built-in ATC)

SP10B

- General purpose, pH
- Epoxy body
- 0...14 pH, 0...80°C
- Single junction, sealed
- 110xØ12 mm



SP10T

- General purpose, pH + ATC (Pt1000)
- Epoxy body
- 0...14 pH, 0...80°C
- Single junction, sealed
- 110xØ12 mm

SP21B

- General purpose, pH
- Glass body
- 0...14 pH, 0...100°C
- Single junction, refillable
- 110xØ12 mm



SP21T

- General purpose, pH + ATC (Pt1000)
- Glass body
- 0...14 pH, 0...100°C
- Single junction, refillable
- 110xØ12 mm

Speciality pH electrodes

supplied with S7 plug head

SP11X

- Rugged easy to clean Tuff-Tip®, pH
- Epoxy body
- 0...14 pH, 0...100°C
- Double junction, sealed
- 110xØ12 mm



SP21X

- General purpose, pH
- Glass body
- 0...14 pH, 0...100°C
- Single junction, refillable
- 110xØ12 mm



SP22X

- High temperature
- Glass body
- 0...14 pH, 5...110°C
- Double junction, sealed
- 110xØ12 mm



SP24X

- Spear tip, pH
- Glass body
- 0...14 pH, 0...80°C
- Double junction, sealed
- 25xØ5 mm



SP26X

- Sleeve junction, pH
- Glass body
- 0...14 pH, 0...100°C
- Double junction, refillable
- 110xØ12 mm



SP27X

- Flat surface, pH
- Epoxy body
- 0...14 pH, 0...80°C
- Single junction, sealed
- 110xØ12 mm



SP28X

- Micro electrode, pH
- Glass body
- 0...14 pH, 0...80 °C
- Single junction, refillable
- 130xØ4 mm

**SP29X**

- Test tube, pH
- Glass body
- 0...14 pH, 0...100 °C
- Single junction, refillable
- 250xØ8 mm

**ORP electrodes***supplied with S7 plug head***SP50X**

- General purpose, platinum ORP (redox)
- Epoxy body
- 0...±2000 mV, 0...80 °C
- Single junction, sealed
- 110xØ12 mm

**SP60X**

- Platinum ORP (redox)
- Glass body
- 0...±2000 mV, 0...100 °C
- Single junction, refillable
- 110xØ12 mm

**SP65X**

- Silver ORP (redox)
- Glass body
- 0...±2000 mV, 0...100 °C
- Single junction, refillable
- 110xØ12 mm

**Titration electrode***supplied with S7 plug head***SP04X**

- General purpose, double platinum
- Titration electrode
- Glass body
- 0...100 °C
- 110xØ12 mm

**Sterilisable pH electrodes***supplied with S8 plug head*

- For all sterile biotech applications, pH
- 0...13 pH, +5...135 °C, max. 10 bar
- Glass body, double junction, sealed
- Steam sterilisable
- Needs no pressurisation



SP91Y: 110xØ12 mm

SP92Y: 120xØ12 mm

SP93Y: 130xØ12 mm

SP94Y: 160xØ12 mm

SP95Y: 210xØ12 mm

SP96Y: 260xØ12 mm

SP97Y: 310xØ12 mm

SP98Y: 360xØ12 mm

SP99Y: 420xØ12 mm

pH/ORP electrode*supplied with 1 m of cable and 2 BNC plugs***SP35B**

- pH/ORP combination electrode
- 0...12 pH, 0...±2000 mV
- Glass body
- 0...100 °C
- 110xØ12 mm



Conductivity electrodes

supplied with 1 m of cable and BNC plug (+ 2 banana plugs for built-in ATC)

SK10B

- General purpose, conductivity
- Epoxy body
- 1 cm², 0...80 °C
- Dual graphite plates
- 110xØ12 mm



SK10T

- General purpose, conductivity + ATC (Pt1000)
- Epoxy body
- 1 cm², 0...80 °C
- Dual graphite plates
- 110xØ12 mm

SK20B

- General purpose, conductivity
- Glass body
- 1 cm², 0...110 °C
- Dual platinum rings
- 110xØ12 mm



SK20T

- General purpose, conductivity + ATC (Pt1000)
- Glass body
- 1 cm², 0...110 °C
- Dual platinum rings
- 110xØ12 mm

SK12T

- Low conductivities + ATC (Pt1000)
- Epoxy body
- 0.1 cm², 0...80 °C
- Dual graphite plates
- 110xØ12 mm



SK21T

- Low conductivities + ATC (Pt1000)
- Glass body
- 0.1 cm², 0...110 °C
- Dual platinum plates
- 110xØ12 mm



SK23T

- High conductivities + ATC (Pt1000)
- Glass body
- 10 cm², 0...110 °C
- Dual platinum rings
- 130xØ12 mm



SK24T

- Micro electrode + ATC (Pt1000)
- Glass body
- 1 cm², 0...100 °C
- Dual platinum plates
- 110xØ6 mm



Temperature Compensators

supplied with 1 m of cable and 2 banana plugs

ST10N

- General purpose, ATC
- Stainless steel body, PTFE coated
- -30...+130 °C
- Pt1000
- 110xØ4 mm



ST20N

- General purpose, ATC
- Glass body
- -30...+130 °C
- Pt1000
- 110xØ8 mm



Dissolved oxygen electrode

supplied with BNC plug + 2 banana plugs, electrolyte and spare membrane

SZ10T

- Galvanic type + ATC (Pt1000)
- Epoxy body
- 0...60 mg/l, 0...50 °C
- With 3 m submersible cable
- 110xØ12 mm

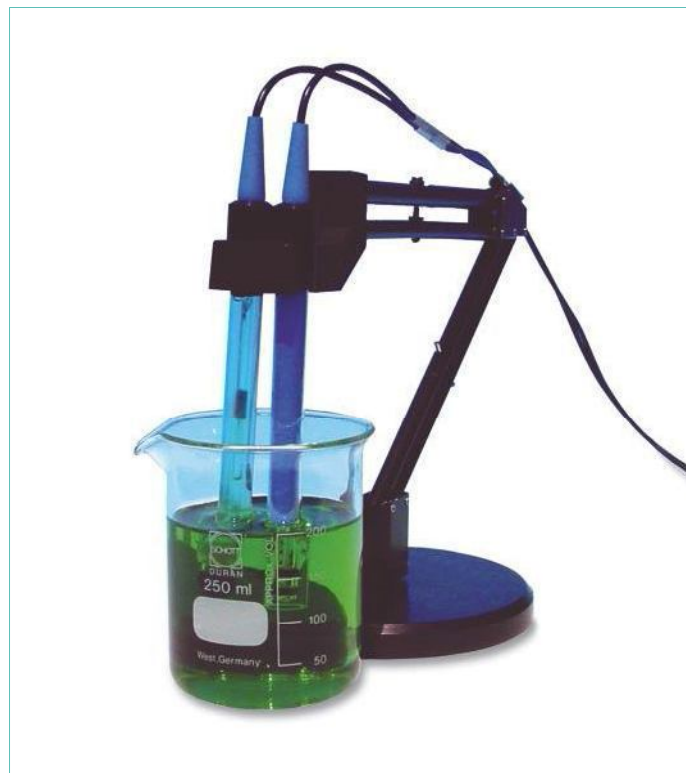
**SZ02K**

- set of 3 membranes + electrolyte

AP414**Serial 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.
- For direct connection to all meters with a digital output.
- 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**Flexible 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

Electrode cables and accessories

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
SC45B	S7/S8 cable, 45 m, with BNC plug
A4021	Adaptor, BNC to DIN socket
A4022	Adaptor, BNC to 2 banana
A4025	Adaptor, BNC to Radiometer socket
S295	Storage bottle for electrodes, 8 ml



Ion selective electrodes

supplied with 1 m of cable and BNC plug

- Polymer membrane electrodes consist of various ion-exchange materials in an inert matrix such as PVC, polythene or silicone rubber. The potential developed at the membrane surface is related to the concentration of the species of interest.
- Solid state electrodes utilise relatively insoluble inorganic salts in a membrane. Solid state electrodes exist in homogeneous or heterogeneous forms. In both types, potentials are developed at the membrane surface due to the ion-exchange process.
- Glass membrane electrodes are formed by the doping of the silicon dioxide glass matrix with various chemicals. The most common of the glass membrane electrodes is the pH electrode. Glass membrane electrodes are also available for the measurement of sodium ions.
- 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. The pH of the filling solution changes as the gas reacts with it which is detected by the built-in pH sensor.
- All models are combination electrodes and have an epoxy body.
- Dimensions: 110xØ12 mm.
- Each electrode comes with user instructions.
- **Two versions available:** standard (ISE20B...ISE52B) or with replaceable membrane (ISE60B...ISE82B).



Model	Ion	Sensor	Range (M)	Range (ppm)	°C	Interferences	pH	Electrolyte
ISE20B ISE60B	Ammonium NH ₄ ⁺	polymer	5.10 ⁻⁶ - 10 ⁰	0.1 - 18000	0 - 50	K ⁺	4 - 10	NaCl
ISE21B ISE61B	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 ISE62B	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 ISE63B	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 ISE64B	Chloride Cl ⁻	solid state	5.10 ⁻⁵ - 10 ⁰	1.8 - 35500	0 - 50	I ⁻ , Br ⁻ , CN ⁻ , S ²⁻	1 - 12	KNO ₃
ISE25B ISE65B	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 ISE66B	Cyanide CN ⁻	solid state	5.10 ⁻⁶ - 10 ⁻²	0.13 - 260	0 - 50	Cl ⁻ , Br ⁻ , I ⁻ , S ²⁻	11 - 13	KNO ₃
ISE27B ISE67B	Fluoride F ⁻	solid state	10 ⁻⁶ - sat.	0.02 - sat.	0 - 50	OH ⁻	5 - 8	KCl
ISE28B ISE68B	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 ISE69B	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 ISE70B	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 ISE71B	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 ISE72B	Perchlorate ClO ₄ ⁻	polymer	7.10 ⁻⁶ - 10 ⁰	0.7 - 99500	0 - 50	-	2.5 - 11	(NH ₄) ₂ SO ₄
ISE33B ISE73B	Potassium K ⁺	polymer	10 ⁻⁶ - 10 ⁰	0.04 - 39000	0 - 50	Cs ⁺ , NH ₄ ⁺	2 - 12	NaCl
ISE34B ISE74B	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 ISE76B	Surfactant X ⁻ /X ⁻	polymer	10 ⁻⁵ - 5.10 ⁻²	1 - 12000	0 - 50	similar types of surfactants	2 - 12	KCl
ISE37B ISE77B	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 ISE80B	Ammonia NH ₃	gas sensing	5.10 ⁻⁷ - 10 ⁰	0.01 - 17000	0 - 50	volatile amines	11 - 13	NH ₄ Cl
ISE51B ISE81B	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 ISE82B	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