

## Which electrode for which application?

Application	Specifics	Electrode	Order no.	Application	Specifics	Electrode	Order no.
<b>Aqueous acid/base titrations</b>	General	Ecotrode Plus Ecotrode Gel	6.0262.100 6.0221.100	<b>Precipitation titrations</b> Silver nitrate	Chloride in general, sodium chloride in food	Ag Titrode	6.0430.100
	Alkaline samples, Bayer liquors Titrations performed at high temperatures	Unitrode	6.0259.100		Chloride in dialysis and infusion solutions	Ag Titrode with Ag <sub>2</sub> S coating	6.0430.100S
	Acidity of alcoholic beverages	Unitrode (with Pt 1000)	6.0258.600		Titrations according to Pharm. Europe & U.S.P.	Ag Titrode with Ag <sub>2</sub> S coating	6.0430.100S
	Titrations with small sample volumes	Flat membrane pH electrode	6.0256.100		Determination of hydrogen sulfide, mercaptans, carbonyl sulfide, sulfides	Ag Titrode with Ag <sub>2</sub> S coating	6.0430.100S
	Electroplating and etching baths containing fluoride or hydrofluoric acid	Combined Sb electrode	6.0421.100		Chloride, bromide, iodide and cyanide in electroplating baths	Ag Titrode with Ag <sub>2</sub> S coating	6.0430.100S
	Carbonate hardness, acid capacity of water, p- & m-value	Aquatrode Plus (with Pt 1000)	6.0257.000		Fluoride/hydrofluoric acid in etching baths	Ion-selective electrode F <sup>-</sup>	6.0502.150
	Electroplating baths	Profitrode	6.0255.100	<b>Complexometric titrations with</b> EDTA, Complexon <sup>®</sup> III and IV	Back-titration of the Ba <sup>2+</sup> excess with EDTA	Ion-selective electrode Ca <sup>2+</sup>	6.0508.110
	Titrations in water having a low conductivity	Aquatrode Plus	6.0253.100		Determination of Ca <sup>2+</sup> , Mg <sup>2+</sup> (Application Bulletin 125)	Ion-selective electrode Ca <sup>2+</sup>	6.0508.110
	Protein-containing samples	Porotrode	6.0235.200		Determination of Al, Ba, Bi, Ca, Cd, Co, Fe, Mg, Ni, Pb, Zn (Application Bulletin 101)	Ion-selective electrode Cu <sup>2+</sup>	6.0502.140
<b>Non-aqueous acid/base titrations</b>	Determination of the acid number (TAN) of mineral oils, titrations with alcoholic KOH, NaOH and TBAOH, potassiummethyleate, free acids; hydroxyl number of oils and fats	Solvotrode (cTEABr) = 0.4 mol/L in ethylene glycol)	6.0229.100 (6.2320.000)	<b>Photometric titrations</b>	With indicators such as Xylenol Orange, N,N-Diethyl-1,4-phenylenediamine, Phenolphthalein, Thorin, Dichlorophenol indophenol	Spectrosense 523 nm	6.5501.100 (Titrimo) 6.5501.200 (Titrando, Titrimo plus)
	Determination of the base number (TBN) of mineral oils, titrations with perchloric acid, cyclohexylamine, alcoholic HCl	Solvotrode (LiCl <sub>sat</sub> in ethanol)	6.0229.100		With indicators such as Dimethylsulfonazo III, Hydroxy Naphthol Blue, Eriochrome Black T, HHSNN, Diphenylaminosulfonate, Murexide	Spectrosense 610 nm	6.5501.110 (Titrimo) 6.5501.210 (Titrando, Titrimo plus)
<b>Redox titrations</b> Arsenite Cerium sulfate Iron(III) Iodine Potassium bromate Sodium nitrite Oxalic acid Permanganate Thiosulfate Titanium(III) Hg(NO <sub>3</sub> ) <sub>2</sub>	Titrations in I <sub>pot</sub> mode	Double Pt-wire electrode	6.0341.100	<b>Surfactants in non-aqueous media</b> Aromatic/aliphatic hydrocarbons, ketones, chloroethanes, methylisobutylketone	Titration of anionic and cationic surfactants, titrations in chloroform, surfactant formulations containing oils, pH < 10	Surfactrode Resistant	6.0507.130
	Redox titrations at varying pH value	Combined LL Pt-ring electrode	6.0451.100		Titration of anionic and cationic surfactants, titration of washing agents, soaps, pH > 10	Surfactrode Refill	6.0507.140
	Chemical oxigen demand in water (ferrometry)	Combined LL Au-ring electrode	6.0452.100		<b>Surfactants in aqueous media</b>	Titration of cationic surfactants	Cationic Surfactant
	Penicillin, Ampicillin	Combined LL Au-ring electrode	6.0452.100	Titration of anionic surfactants		Ionic Surfactant	6.0507.120
	Titrations at constant pH value	Pt Titrode	6.0431.100	Titration of non-ionic surfactants, titration of pharmaceutical ingredients with sodium tetraphenylborate	NIO Electrode	6.0507.010	
	Bromatometry, iodometry, cerimetry according to Pharm. Europe & U.S.P.	Pt Titrode	6.0431.100				
<b>Karl Fischer titrations</b>	Water content according to Karl Fischer	Double Pt-wire electrode (HF-resistant version on request)	6.0338.100				



# Practical tips, care and maintenance



Ecotrode Plus	Ecotrode Gel	Unitrode	Aquatrode Plus	Profitrode	Solvotrode	Ag/Pt/Au Titrodes	Combined Ag/Pt/Au electrodes	Surfactrodes	Surfactant electrodes	Spectrosense
<p>Fixed ground-joint diaphragm</p> <p>Insensitive to contamination</p> <p>Attractive price/performance ratio</p> <p><b>Ordering info</b> 6.0262.100</p>	<p>Twin-pore diaphragma</p> <p>For routine measurements in similar samples with life-time indicator</p> <p>Maintenance-free reference electrolyte (gel)</p> <p><b>Ordering info</b> 6.0221.100</p>	<p>Fixed ground-joint diaphragm</p> <p>Very low alkali error</p> <p>Insensitive to contamination</p> <p>High temperature resistance</p> <p><b>Ordering info</b> 6.0259.100 without cable 6.0258.010 (with Pt 1000) with fixed cable, plug F+2 x 2 mm 6.0258.600 with Pt 1000 (without cable)</p>	<p>Fixed ground-joint diaphragm</p> <p>Rapid response in ion-deficient or weakly buffered solutions</p> <p>Insensitive to contamination</p> <p><b>Ordering info</b> 6.0253.100 without cable 6.0257.000 (with Pt 1000) with fixed cable, plug F+2 x 4 mm</p>	<p>Ground-joint diaphragm</p> <p>For difficult matrices</p> <p>Double-junction construction</p> <p><b>Ordering info</b> 6.0255.100 (Fitting length = 113 mm) 6.0255.110 (Fitting length = 170 mm) 6.0255.120 (Fitting length = 310 mm)</p>	<p>Ground-joint diaphragm</p> <p>For titrations in non-aqueous matrices</p> <p>Rapid response in organic solvents</p> <p>Electrically shielded</p> <p><b>Ordering info</b> 6.0229.100</p>	<p>Maintenance-free pH glass reference system</p> <p>Also available as micro-electrodes with 6.4 mm diameter</p> <p><b>Ordering info</b> Ag Titrode 6.0430.100 Pt Titrode 6.0431.100 Micro-Au Titrode 6.0435.110</p>	<p>Ceramic-pin diaphragm</p> <p>For precipitation or redox titrations with change of pH value</p> <p><b>Ordering info</b> Ag: 6.0450.100 Pt: 6.0451.100 Au: 6.0452.100</p>	<p>For surfactant titrations in non-aqueous media</p> <p><b>Surfactrode Resistant (6.0507.130)</b></p> <p>Resistant to chloroform and many other solvents</p> <p><b>Surfactrode Refill (6.0507.140)</b></p> <p>Refillable surfactant electrode, thus practically unlimited working life</p> <p>Not resistant to chloroform</p>	<p>For surfactant titrations in aqueous media</p> <p><b>NIO Electrode (6.0507.010)</b></p> <p>For titration of non-ionic surfactants</p> <p><b>Ionic Surfactant (6.0507.120)</b></p> <p>Optimized for anionic surfactants</p> <p><b>Cationic Surfactant (6.0507.150)</b></p> <p>Optimized for cationic surfactants</p>	<p>Two wavelengths available: 523 and 610 nm</p> <p>Power supplied by titrator, no separate power adapter needed.</p> <p><b>Ordering info</b> Titrimo: 6.5501.100 (523 nm) 6.5501.200 (610 nm) Titrimo, Titrimo plus: 6.5501.110 (523 nm) 6.5501.210 (610 nm) all cables included</p>
<p>Store in 6.2323.000 storage solution only!</p> <p>Do not wipe electrode!</p> <p>For cleaning/care 6.2325.000 pHit Kit is recommended.</p>	<p>Store in 6.2308.000 KCl sat.</p> <p>Rinse with water or ethanol to remove contamination.</p>	<p>Use 6.2308.040 Idrolyte for titrations at temperatures 80...100 °C or to suppress protein precipitation by KCL.</p> <p>Rinse with water or ethanol to remove contamination.</p> <p>Do not wipe electrode!</p> <p>Unitrodes filled with c(KCl)=3 mol/L should be stored in 6.2323.000 storage solution.</p> <p>For cleaning/care 6.2325.000 pHit Kit is recommended.</p>	<p>Store in 6.2323.000 storage solution only!</p> <p>Do not wipe electrode!</p> <p>For cleaning care 6.2325.000 pHit Kit is recommended.</p>	<p>Store in bridge electrolyte.</p> <p>Do not wipe electrode!</p> <p>If the sleeve ring is blocked, place the electrode in hot water and try again.</p> <p>Spare ground-joint diaphragm: Order no. 6.1243.020</p> <p>For cleaning/care 6.2325.000 pHit Kit is recommended.</p>	<p>Store in reference electrolyte.</p> <p>Do not wipe electrode!</p> <p>Condition in dist. water before next titration (glass membrane only!).</p> <p>If the sleeve ring is blocked, place electrode in hot water and try again.</p> <p>Alternative electrolyte: c(TEABr) = 0.4 mol/L in ethylene glycol (6.2320.000)</p>	<p>Store in distilled water only.</p> <p>Testing of the electrodes according to AB 48.</p> <p>Also available with Ag<sub>2</sub>S or Ag-halide coating.</p>	<p>Store in reference electrolyte.</p> <p>Testing of the electrodes according to AB 48.</p> <p>Also available with Ag<sub>2</sub>S or Ag-halide coating.</p>	<p>Allow a few titrations for conditioning of the Surfactrodes.</p> <p>Reactivate Surfactrode Resistant with fine-grained sandpaper if response is poor.</p> <p>Testing of the electrodes according to AB 305.</p>	<p>Rinse with dist. water or 20% methanol in water.</p> <p>Wipe carefully with a methanol-soaked tissue to remove any adhering contamination.</p> <p>Do not use in organic matrices or at temperatures &gt;40 °C!</p> <p>Testing of the electrodes according to AB 305.</p>	<p>Allow three minutes for warming up the LED.</p> <p>Clean mirror with soft cloth only; do not touch with fingers.</p>