



Polarograph **TEA 4000** Ultra Trace Element Analysis

Technology, Operation and Performance

Our analyser **TEA 4000** is the result of a cooperation with the Heyrovsky-Institut.

The **TEA 4000** is a compact analyser which is completely operated via computer and supplied software.

A very reasonable purchase price and low operation expenses as well as the possibility to run off-grid with the optional battery pack makes the **TEA 4000** polarograph the best solution for trace analysis - in the laboratory, in the industry and in the field.

The polarography/voltammetry is one of the most important analytical techniques in environmental protection, mineralogy, metallurgy, geology and industry.

Possible fields of applications are

- Quality assurance in the metal and electronics industry as well as in chemistry and food-production.
- Investigation of waters and soil (environmental analysis)
- Waste and process water monitoring.
- Purity analysis in galvanic, metallurgy, etc. (ultra trace element analysis)
- Tribodiagnostics in the engine industry.
- and other applications.





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System Equipment

The **TEA 4000** includes the polarography stand with connection materials, power supply, the HMDE and other electrodes and the measuring software.

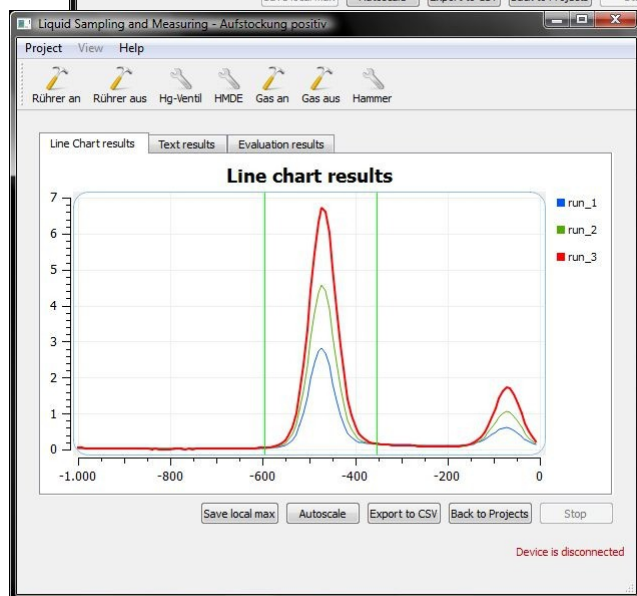
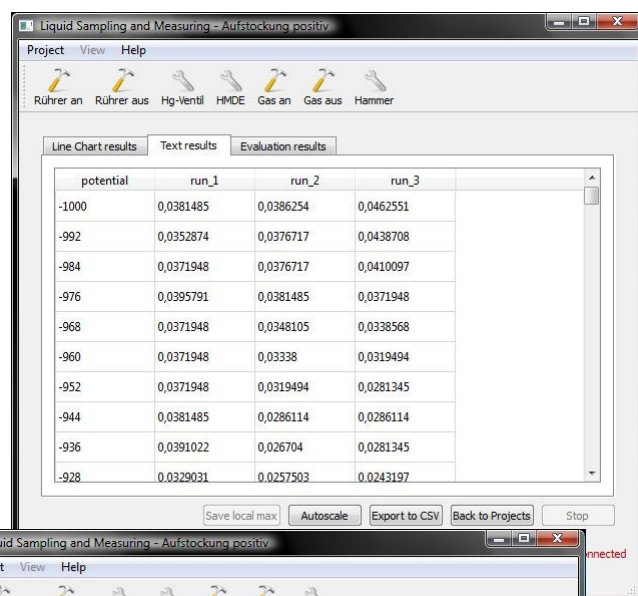
A lot of different polarography measurement techniques are available on the **TEA 4000**. A wide range of possible applications are listed in the method manual.

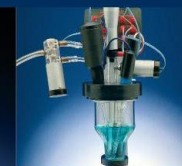
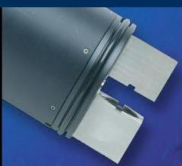
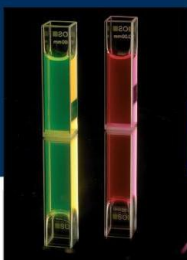
Advantages over AAS and ICP are:

- lower costs
- partial better detection limits
- easier sample preparation
- simultaneous measurement of metals
- short analysis time.

HMDE

Our Hanging Mercury Drop Electrode (HMDE) enables trace analysis with extremely low detection limits. The mercury consumption is not more than approx. 1,5 mL per year. Together with the HMDE the system can be fitted with solid state electrodes (glassy carbon, gold, platinum and silver). The solid state electrodes are delivered with PTFE bodies, on request we can also exchange them with glass bodies.





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Accessories

Besides further electrodes you can also purchase an upgrade for our laboratory polarograph **TEA 4000**:

Field Module The **TEA 4000** field case is specially designed for transporting the polarograph in the field for mobile measurements. Together with the polarography stand it accommodates also accessories like the electrodes, a small bottle inert gas, the battery pack for the power-supply as well as chemicals, polarography standards and pipettes. Each field module includes a **Lab Kit**.

To run the **TEA 4000** off-grid we offer a rechargeable battery pack or a 12 V car-adaptor optionally.

Consumables

Complementary to our polarograph we are offering a complete kit with 18 polarography standards, pipettes, buffers and chelating agents. The **Lab Kit** includes de-ionised water and dimethylglyoxime, ammonium buffer, acetate buffer, measuring flask, polishing kit for solid state electrodes and variable pipettes together with pipette tips, KCl and 18 polarography standards: Cd, Hg, Zn, Pb, Cu, As, Ni, Tl, Cr (total), Cr (VI), Co, Ag, Sn, Fe, Mn, Sb, Se, Al.

To reduce negative effects of oxygen in some applications, it is necessary to purge the measuring solution and the atmosphere within the measuring cell with **inert gas**. In this case - technical and economical - nitrogen is the best solution.

Inert gas is present in many laboratories or can be purchased from several chemical suppliers directly or - of course - also from us. For mobile measurements and storage in our field case a small 1 L bottle would be the best option.





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Ultra Trace Element Analysis

Application examples

The polarography/voltammetry can determine a lot of different elements and substances like cations, anions and organic compounds.

Cations

Cadmium, Lead and Copper
Zinc, Cadmium, Lead and Copper
Manganese and Iron
Iron (III) and Total-Iron
Lead
Antimony
Arsenic
Nickel
Selenium
Chromium
Vanadium
Tin
Ammonium
Beryllium
Aluminium
Manganese
Mercury
Silver

Anions

Sulfide, Sulfite and Thiosulfate
Chloride and Bromide
Nitrate
Nitrite
Cyanide

Organic compounds

Vitamin C in Fruit Juice
Vitamin B2 (Riboflavine)
Vitamin B9
Nicotinamides
Cystine and Cysteine
Aldehydes
some Pesticides



Polarograph **TEA 4000**

Ultra Trace Element Analysis

The following equipment components are available:

			Artikel-Nr.
Polarograph TEA 4000			TEA4000-0100
includes measuring cell, stirrer with rod, hammer, HMDE (hanging mercury drop electrode), glassy-carbon working electrode, silver chloride reference electrode, platinum auxiliary electrode, polishing kit for solid electrodes, power supply, USB connection cable, measuring software and manuals.			
Polarograph TEA 4000 - Set			TEA4000-0000
Same content as TEA4000-0100. Additionally includes: gold working electrode, Field Module and a preconfigured notebook			
Accessories			
Field Module			TEA4000-5085
- Upgrade for field measurements -			
Field case including battery, charger and Lab Kit			
Electrodes		Body	
HMDE	Hanging mercury drop electrode		TEA4000-0010
Au	Working electrode	PTFE	TEA4000-1210
Pt	Working electrode	PTFE	TEA4000-1280
GC	Working electrode	PTFE	TEA4000-1120
Ag	Working electrode	PTFE	TEA4000-1300
Ag/AgCl	Reference electrode	PTFE	TEA4000-2180
Hg ₂ /Hg ₂ Cl ₂	Reference electrode	PTFE	TEA4000-2240
Hg/HgSO ₄	Reference electrode	PTFE	TEA4000-2260
Ag/AgCl	Reference electrode	Glass	TEA4000-2181
Hg ₂ /Hg ₂ Cl ₂	Reference electrode	Glass	TEA4000-2241
Hg/HgSO ₄	Reference electrode	Glass	TEA4000-2261
Pt	Auxiliary electrode	PTFE	TEA4000-2160
Pt	Auxiliary electrode	Glass	TEA4000-2161
Consumables			
Inert gas, one way bottle for the field case			TEA4000-5090
Lab Kit with 18 polarography standards			TEA4000-6030

Technical Specifications:

Measuring methods:	DC	Direct current		
	DCS	Direct current stripping		
	DP	Differential pulse		
	DPS	Differential pulse stripping		
	CV	Cyclic voltametry		
Detection limits: (in extracts)	Cd	0.05 ppb	Se	1 ppb
	Cr	0.01 ppb	Mn	3 ppb
	Cu	0.05 ppb	Tl	5 ppb
	Hg	0.03 ppb	Fe	5 ppb
	Ni	0.01 ppb	NO ₂ ⁻	10 ppb
	Pb	0.05 ppb	NO ₃ ⁻	50 ppb
	Zn	0.05 ppb	Cl ⁻	1 ppb
	Co	0.01 ppb	S ²⁻	10 ppb
	As	0.5 ppb		
Sweep voltage range:		± 2,5 V		
Sweep rate:		DC, CV 1 V/s with voltage step 10 mV		
(per measuring point)		DP 66 mV/s with voltage step 10 mV		
Current range:		10 nA FS – 2 mA FS		
Minimum current:		0,1 nA		
Control:		with PC via USB		
Current supply:		Power-supply unit, battery pack or car-adapter; 12 VDC		
Dimensions:		27 cm x 35 cm x 22 cm		
Weight:		3 kg		
Warranty:		1 Year		