

PCA2

PORTABLE COULOMETRIC ANALYSER

APPLICATION FIELDS

-  Drinking water
-  Surface water
-  Waste water
-  Foods and beverages
-  Biological samples



The new Portable Coulometric Analyser PCA is designed for laboratory and field analysis of heavy metals, semi-metals and numerous non-metals in aquatic solutions for a broad concentration range address-

ing contents from sub- $\mu\text{g/L}$ up to several g/L . In battery operation mode it is well suited for field applications. The analysis is full automatic, the sample solution is transported to the electrochemical measuring

cell by means of a small but robust peristaltic pump and on completing the analysis the result is displayed and stored in the memory. The human interface is a simple touch screen.

UNIQUE FEATURES

- Metals, semi-metals, non-metals
- Robust portable design
- Full automatic analysis
- At least 12 hours on battery operation ideal for field applications
- Simple and fast operation
- Ready to use applications
- Broad concentration range, starting at sub- $\mu\text{g/L}$
- Also suitable for coloured and turbid samples

TYPICAL APPLICATIONS INCLUDE

- Arsenic, antimony, tin and selenium in various water samples
 - Heavy metals such as mercury, thallium, cadmium, indium, lead, bismuth, silver, gold.
 - Manganese, iron, cobalt, nickel, copper, zinc, gallium in various water samples
 - Chromium(VI) and total chromium
 - Iron(II), iron(III), total iron
 - Arsenic(III) and total arsenic
 - C-vitamin in vegetables, fruits, beverages, foods
 - Fluoride, chloride, bromide, iodide in waters and biological samples
 - Disinfection reagents such as chlorine, chlorine dioxide, hypochlorite in drinking water
 - Disinfection by-products such as chlorite, bromate in drinking water
 - Sulphite in foods, wines and beers
 - Sulphides in waste waters
 - Ammonia, hydrazine, nitrite, nitrate, cyanide in aquatic samples
 - Phosphate in waste waters
 - Ethanol in beverages
 - Methanol in waste water
 - Acids and bases in aquatic solutions, wines
- Samples with suspended particles and solid samples can be analysed after an appropriate sample digestion, e.g. thermal, UV or microwave-assisted sample digestion.

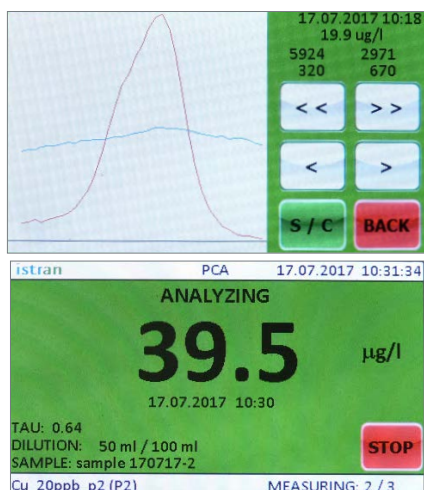
Ag, Ammonia, As, Bromate, Bromide, Cd, Chloride, Chlorite, Co, Cr(VI), Cu, EDTA, Fe, Hg, Iodide, Mn, Ni, Nitrite, Pb, Sb, Se, Sn, Sulphide, Ti, Zn

ANALYSIS PRINCIPLE

The analysis is based on automatic flow-through coulometry and voltammetry making use of a unique robust electrochemical measuring cell with a maintenance-free built-in reference and auxiliary electrodes and a long-life disposable working electrode. The sample solution is pumped into the cell where the determined species (analyte) is measured through its electrochemical conversion, i.e. it is electrochemically oxidised or reduced at the electrode surface. Low concentrations are determined after a preliminary electrochemical deposition of the measured species at the electrode surface (enrichment step), then the deposit is stripped by constant current while the signal is recorded and evaluated. In such a way, concentrations in the sub- $\mu\text{g/L}$ level can be easily measured. A typical response of copper displayed on the touchscreen is depicted below.

The analytical procedure consists of three main steps:

- 1. Sample preparation.** It includes the filtration of the sample (when necessary) and addition of a reagent to the sample. Solid samples or samples with suspended particles require a sample digestion.
- 2. Analysis.** Full automatic procedure yielding the result displayed on the touch screen. The analysis starts on immersing the sampling tube into the sample which is pumped through the measuring cell where the analyte is electrochemically measured. Usually multiple runs are done with measurements repeated and evaluated automatically.
- 3. Cleaning.** On completion of the analyses the cell is rinsed with water or a suitable reagent solution and the analyser is set to standby mode or turned down.



CONTROL AND COMMUNICATION

- User interface: Powerful 4.3" Intelligent LCD-TFT display module. 480 x 272 Resolution, RGB 65K true to life colours, TFT Screen with integrated 4-wire Resistive Touch Panel. On-board micro-SD memory card connector for data logging purposes.
- User interface for uploading new measuring parameters, downloading results and curves
- User interface with administrator access, firmware upgrading and calibration of electronic circuits

MECHANICAL AND ELECTRICAL DATA

Enclosure: The PCA instrument is integrated into a robust transport case made of polypropylene. Watertight, crushproof, and dustproof. Protection class IP 67	
Dimensions (W x D x H): 27 x 24.6 x 12.4 cm (10.62" x 9.68" x 4.87")	Weight: 2.9 kg (6.4 lbs)
Power input: 100-240V/50-60Hz	Battery: Ni-MH, 14.4V/4.5Ah
Ambient operating conditions: 5 °C - 45 °C at 5 - 95% relative humidity non-condensing (41 °F - 113 °F)	

TECHNICAL SPECIFICATIONS

MEASUREMENT

- Analysis method: Coulometry and voltammetry in chronopotentiometric mode
- Determined species: Metals, semi-metals, non-metals, organics (refer to the up to date list of applications)
- Measuring cell: robust three-electrode flow-through cell. Built-in maintenance-free platinum auxiliary and silver/silver chloride reference electrodes. Longlife disposable working electrodes made of glassy carbon, gold, silver, platinum, copper. No mercury or gold plating solutions required.
- Detection limit: less than 1 $\mu\text{g/L}$ *
- Precision (RSD, under repeatability conditions): 5 % full scale for calibration or validation solutions
- Calibration: A built-in 10 point calibration curve adjusted in the factory
- Re-calibration: Two point re-calibration (blank and calibration solution) carried out on demand
- Measuring ranges: Please check the respective application list for each parameter
- Analysis time/run: 1-10 min, depending on the analyte concentration *.
*Refer to the corresponding application list

GLP FEATURES

- Automatic storage of about 1000 results, including the corresponding signal curve, date, time of analysis and the sample identifier.
- Statistical evaluation of the results
- Checking the accuracy and precision by means of a control sample with known analyte concentration.

REAGENTS AND CONSUMABLES

- Reagents, consumables, containers and tools can be transported in a separate transport case
- Reagent consumption is low, usually 0.1 to 1 mL/sample
- No organic or toxic reagents are used
- All reagents and consumables are delivered by the producer
- Reagent formulas are available against royalties
- Cleaning solution: Demineralised water or in most cases tap water is sufficient
- Calibration or validation solution: Available from the producer, prepared from single element Certified Reference Materials

OPTIONS

- Additional applications each including a measurement parameter file, measuring cell (if needed), electrode
- Transport case for reagents, consumables, tools ideal for field operation

DATA LOGGING AND SECURITY

- Log files with over 1000 results and corresponding curves are stored
- Easy export to spreadsheet files