



ELECTRO-CHEMICAL DEVICES

Model CA900 Analyzer Alkalinity



OVERVIEW

Thank you for purchasing our Model CA900 Analyzer.

The CA900-Analyzer was designed and manufactured to be an easy-to-use, high-sensitivity and low-cost measuring instrument. This Analyzer should give you many years of reliable and hassle-free operation with regular care and maintenance.

This document is the Operating Manual for the Analyzer. We recommend that you enter the information below the first opportunity you get.

Product Name	CA900 Analyzer
Product Model	CA900 Alkalinity
Purchase Date	XXX XX 201X
Serial No	XXXXXX
Warranty Period, Begin-End Dates	1 year from date of shipment
Password	
Contact Details, Your Distributor	XXXXXXXXXX XXXXXXXXXX XXXXXXXXXX
	Phone: Internet:
Contact Details	Electro-Chemical Devices Phone: +1-714-695-0051 Fax: +1-714-695-0057 Email: sales@ecdi.com Internet: www.ecdi.com

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CA900 Technical Specifications	
Analysis:	Alkalinity
Method:	Titration using pH Sensor
Measuring range:	Measurement Specific (See Chapter 11 for Analyzer performance)
Response time:	10 minute cycle plus any user entered wait time
Repeatability:	+/- 2% or +/- 2 ppm, whichever is greater, on the measurement
Drift:	+/- 2% per month on the measurement
Power supply:	110-220Vac, 50-60 Hz 80 VA
Mounting:	Wall mounting or with optional bench support
Operating temperature:	5°C to 50°C
Cabinet:	Plastic Shell
Dimensions:	16"W x 36"H x 8.5"D (406 mm W x 915mm H x 216mm D)
Weight:	Approx. 40 lbs (18 kg)
Reagent consumption:	Dependent on Sample
Analog output:	(4) 4-20 mA
Alarms:	(4) configurable relays
Sample	
Inlet sample pressure:	Atmospheric
Outlet sample pressure:	Atmospheric

INTRODUCTION – ANALYZER DESCRIPTION

This manual provides general information regarding the principles of operation, the proper installation and operation of the CA900 Analyzer.

The Model CA900 is an on-line sequential sampling analyzer (a sequence of sampling, analysis and result processing), using titration methods.

The analyzer is assembled with two separated sections with two lockable doors. The bottom section is the LIQUIDS section. It includes all of the components involved in the flow, mixing and reaction stages of the sample and reagents (sampling pump, titration reaction cell...). The top section is the ELECTRICAL enclosure. It includes the main power supply, the controller PCB assembly and the touch screen interface.



Applications

The measurement is a titration analysis using a pH sensor to determine Total Alkalinity. Maintaining water quality with the proper balance of pH and alkalinity levels is essential in many different processes—everything from drinking water to wastewater processes, as well as in irrigation water, water-based beverages and pharmaceuticals, electronics manufacturing and more. Alkalinity is a measure of the capacity of water to neutralize acids and affects pH levels in water. It occurs naturally in ground water and its levels are influenced by rocks and soils, salts, certain plant activities and in some cases by industrial wastewater discharges.

ECD's advanced CA900 Titration Analyzer for alkalinity measurement is so easy to install and start up that a technician can do it in less than 15 minutes. All that is necessary is to perform simple connections of the sample, waste and reagent lines and then power up the factory pre-calibrated analyzer. Wall mounting hardware comes standard with each analyzer, but an optional bench top stand with reagent holder also is available.

Working principle: Titration using pH Electrode

To determine and maintain water quality, accurately measuring the alkalinity of the water is critical to assess its relationship and impact on pH levels. Titration analysis with the CA900 Analyzer calculates alkalinity by dispensing known doses of a titrant fluid into a reaction cell while monitoring the pH level to two end points. The analyzer then uses the titrant concentration and amount dispensed to calculate the Carbonate and bi-carbonate alkalinity measurement.

Calculation of alkalinity or ANC is a simple accounting of the amount of acid used to neutralize the sample to the bicarbonate equivalence point:

$$(meq/L) = (mL) \times (meq/mL) \times CF / (mL) \times (1 L / 1000 mL) = (1000 \times (B) \times (Ca) \times (CF)) / Vs$$

and

$$(mg/L \text{ as } CaCO_3) = (meq/L) \times (1 \text{ mmol } CaCO_3 / 2 \text{ meq}) \times (100.087 \text{ mg } CaCO_3 / 1 \text{ mmol } CaCO_3) \\ = (50044 \times (B) \times (Ca) \times (CF)) / Vs$$

where

Alk is the alkalinity or ANC of the sample.

B is the volume of acid titrant added from the initial pH to the bicarbonate equivalence point (near pH 4.5), in milliliters.

Ca is the concentration of acid titrant, in milliequivalents (meq) per milliliter (same as equivalents per liter, or normality N).

CF is a correction factor (see below).

Vs is the volume of sample, in milliliters. mmol is millimoles, in this case for calcium carbonate.

Analysis Cycle

The CA900 Titration Analyzer typically performs a single alkalinity measurement per analysis cycle. Its standard program sequence consists of a cleaning cycle, sample acquisition, monitoring of pH, the addition of the titrant fluid, mixing the fluid, calculation of results and data storage. The desired frequency of analysis between cycles can be easily modified to the requirements of the user's process.

Typical Run Sequence:

Rinsing and sampling

Drain, rinse and sample functions

First the reaction cell is drained and rinsed (these steps can also be programmed at the end of the run). The hydraulic lines and the reaction cell are rinsed prior to taking the actual sample. Then the sample is taken.

Addition of reagent(s)/Titrant(s)

Add reagent function/ Add Shots

Depending on the method one or more reagents are added or titrated to a specified pH value. Titrants are administered by the amount of shots.

Mixing

Mix functions

The mixing stir bar is activated once the titration sequence begins. The liquid is mixed after every shot administered to the solution.

Data log

Data logging

Data logging is used to determine the Total alkalinity of the sample. It counts the number of Shots being titrated and the pH concentration of the sample while the titration.

Concentration calculation

Calculation

The analyzer will record the number of shots titrated, then a calculation is performed

Drain, conditioning, rinsing, sampling

Drain, rinse and sample functions

Drain and rinse of the hydraulic lines and the reaction cell.

Waiting time (analysis frequency)

Wait function

The wait function allows the frequency of the analysis to set.