



3

# Titration

STANDARD TITRATORS WITH INTERCHANGEABLE MODULES

SI Analytics

a xylem brand

# 3. Burettes and Titrators with interchangeable modules

## TITRONIC® 500 - The burette for all purposes

The TITRONIC® 500 is the ideal piston burette for manual titrations, accurate dosing applications as well as the preparation of solutions. When used with TitriSoft 3.5, it acts as a titration burette or with the TitroLine®7000 and TitriSoft 3.5, it is an automatic dosing unit perfect to pre-dose a titrant.

### Benefits TITRONIC® 500:

- \* Brilliant TFT display with a wide viewing angle
- \* Intelligent interchangeable modules with 5, 10, 20 and 50 ml volume capacity
- \* Connect to a printer and/or an analytical balance
- \* Remote control access via RS232 or USB interface
- \* Connect up to 16 devices using one USB or RS232 port of a PC with the two integrated RS232 interfaces (Daisy Chain)



TITRONIC® 500

## Manual Titration

While the automatic titration is gaining ground, manual titration remains one of the cost-effective standard applications in the lab. Everywhere high precision and flexibility are required; a piston burette with an interchangeable dosing module is the best choice.

- Titration using the manual controller dosing buttons.
- Titration rate can be adjusted to optimize titration speed and accuracy.
- Programmable automatic calculations, printer ready.
- Automatic weight recording when balance is connected.

## Dosing

Besides titration, there are various routine dosing tasks that must be performed in the lab.

- Control dosing using the manual controller and the dedicated keypad.
- Adjustable dosing and filling rates optimize speed and accuracy.
- Store dosing methods with different parameters.

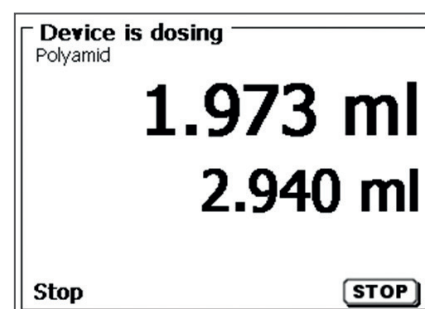


## Solutions preparation

A special sample preparation mode is available on the TITRONIC® 500 where a reagent is dosed into a sample until the required concentration is reached. The sample is weighed, the dosing volume is determined. The volume can then be automatically added to the sample. This mode is used for e.g., preparing standard and sample solutions for viscometry.

- Adjustable dosing and filling speed.
- Dosing volume is automatically calculated without additional PC software.
- Several methods with different parameters can be stored.
- Automatic weight recording when balance is connected.

See also "Sample preparation with TW 7200 sample changer and TitrSoft", page 52.



# TitroLine® 7000: The professional step

With its performance spectrum, the TitroLine® 7000 is the ideal starting device for potentiometric titration with potential for expansion and automation. Thanks to the high-resolution and precise pH/mV and "dead-stop" measuring interface, it is possible to determine a wide range of parameters quickly, reliable and accurate.

Besides the specifications of the instrument series from the general part already mentioned in the introduction and the features of the TITRONIC® 500 and TitroLine® 5000, the TitroLine® 7000 provides more:

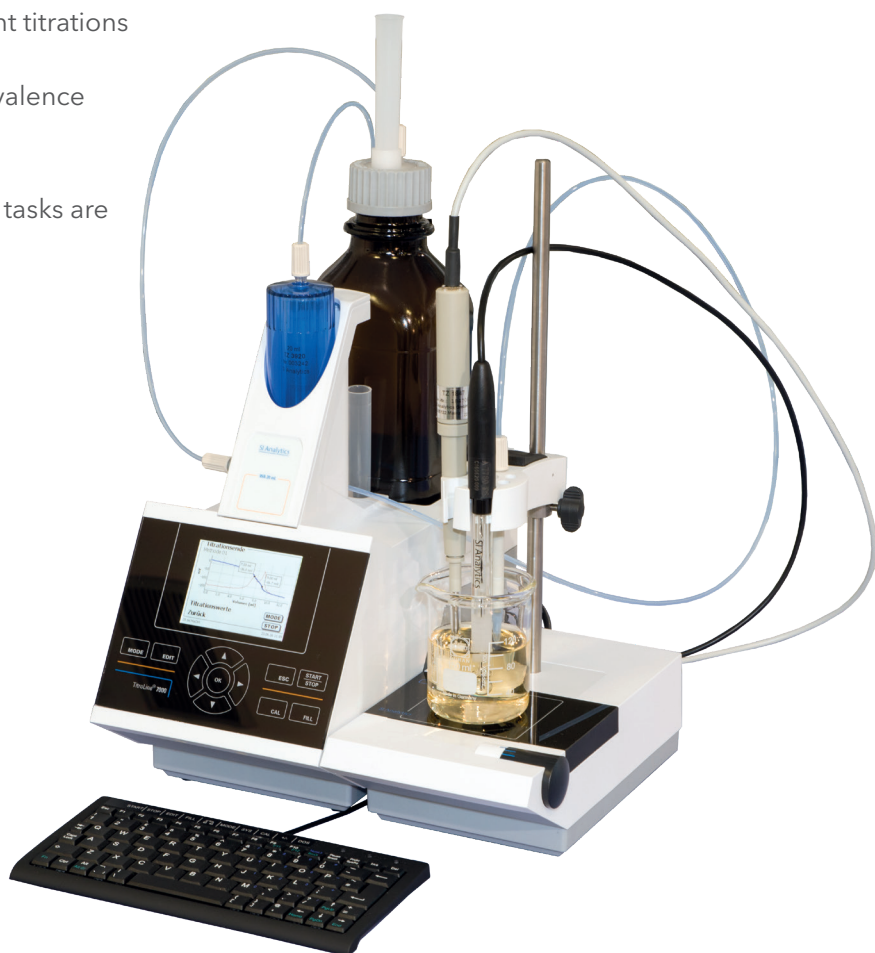
As a rule, 10 to 15 user methods are usually sufficient for the most requirements. But sometimes you need a little bit more capacity. The TitroLine® 7000 offers storage up to 50 user methods.

Measurement and calibration with the highest accuracy: The wireless sensor recognition automatically recognizes SI Analytics® ID electrodes and instantly stores dedicated sensor data eliminating measurement and calibration errors.

## Features of the TitroLine® 7000 include

- High resolution pH/mV-electrode and temperature inputs for pH, ISE, redox (ORP) or photometric titrations.
- Polarizable electrode input for set endpoint titrations („Dead-stop")
- Linear (fixed increment) and dynamic equivalence point titration mode
- Titrations to pH/mV and  $\mu\text{A}$ -Endpoint
- Manual titration mode and routine dosing tasks are also available.

*pH/mV interface  
for ID electrodes*



## Typical applications of water/wastewater and environmental analysis:

- pH-value, alkalinity ("p+m-value")
- Permanganate index
- COD
- Volatile fatty acids/Total anorganic carbon (FOS/TAC)
- Total nitrogen according to Kjeldahl
- Chloride in waste and drinking water
- Free and total chlorine in drinking and bathing water
- Ca/Mg-and total hardness
- Oxygen according to Winkler method



### Food analysis application example: "Determination of free and total sulphurous acid (SO<sub>2</sub>) in wine"

Since ancient times the wine is being preserved through the addition of "sulfur" (sulphurous acid).

The addition of sulphurous acid inhibits the oxidation processes and prevents the growth of unwanted microorganisms. The content of free and total sulphur (exact: sulphur dioxide) is determined through the titration of 10-50 ml sample after the addition of sulphuric acid and potassium iodide with a iodine solution (e.g., 0.025 mol/l) and using a double platinum electrode as indication electrode. The free SO<sub>2</sub> is titrated directly. The total SO<sub>2</sub> is titrated after the hydrolysis with sodium hydroxide which converts the bounded SO<sub>2</sub> into the free form.

The method with all parameters and calculation formula is already stored as standard method in the TitroLine® 7000 and can be used directly.

*Titration application  
„chemical oxygen demand“ COD*

## Typical applications of food analysis:

- Salt content (chloride, sodium chloride).
- pH-value, total acidity in wine, beverages, and food products such as condiments.
- Formol number in fruit and vegetable juices.
- Ascorbic acid (vitamin C).
- Calcium in milk and dairy products.
- Protein determination (Kjeldahl-nitrogen) in milk and dairy products.
- Reducing sugar in wine and juices.
- Iodine number, peroxide number, free fatty acids and saponification number.
- Determination of free and total sulphurous acid (H<sub>2</sub>SO<sub>3</sub>) in wine and must. Further detail is available in the application example.

# TitroLine® 7000 – Versatile Applications

## Perfect for non-aqueous titrations

Eliminate the need for special electrodes (e.g., separate indicator, reference and auxiliary electrodes) with the built-in amplifier—perfect for titrations in non-aqueous solvents such as:

- Acid and base numbers in oils (TAN and TBN)
- Titrations in glacial acetic acid with perchloric acid
- Hydroxyl, NCO (Isocyanate) number and further specific value

## pH Stat Titration

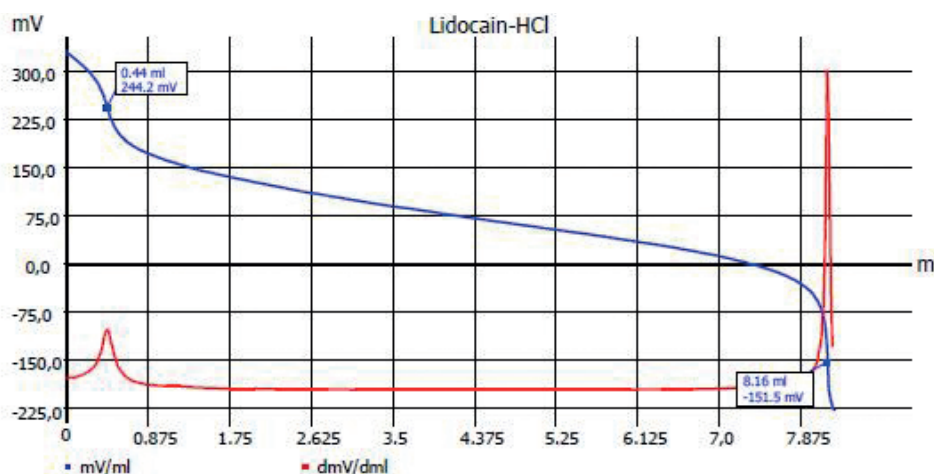
With a pH stat application a given pH is first adjusted and then kept constant at the certain time with an acid or a base. The pH stat titration is applied to e.g.:

- the determination of the enzyme activity (ex. lipase)
- the pH stat elution of soil sample at pH 4
- the monitoring of the pH value during chemical synthesis

### Typical Pharma application example: Titration of amino hydrochlorides (method according to Ph. EUR).

Up to now the amino hydrochlorides were dissolved in glacial acetic acid, the amines released through the addition of mercuric acetate and titrated with perchloric acid in glacial acetic acid.

According to the environment friendly method of the European Pharmacopeia the amino hydrochlorides are dissolved in ethanol and being dosed with exact 5.00 ml of a 0.01 mol/l HCl. This mixture is then titrated with NaOH 0.1 mol/l. Most titration curves show two equivalence points. The result is calculated from the difference between the first and second equivalence point. The method with all parameters and calculation formulae is already stored as standard method in the TitroLine® 7000 and can be used directly after the input of the equivalent substance weight.



Titration curve: Titration of Hydro chloride (Lidocain-HCl)

## Titration with the photometric sensor OptiLine 6

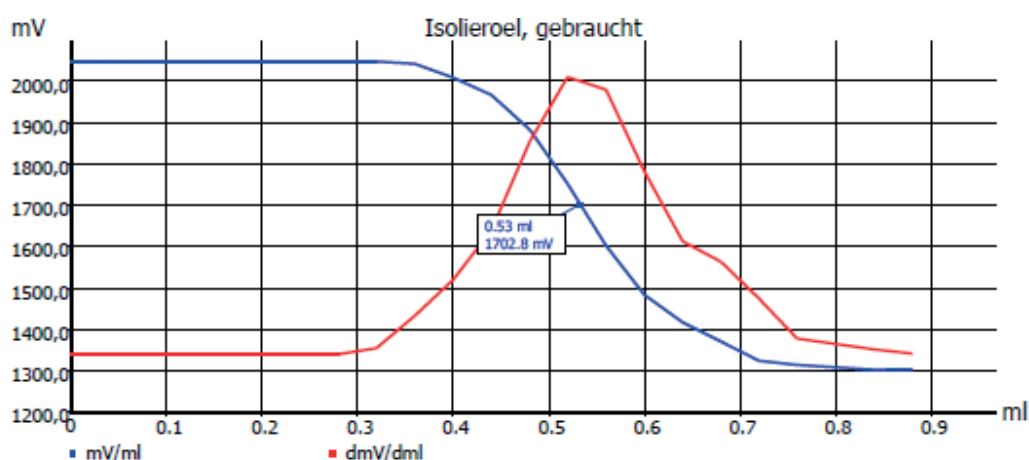
The TitroLine® 7000 allows the connection via USB of the new OptiLine 6 photometric sensor (see page 96). The TitroLine® 7000 uses the digital USB input to set the wavelength and other parameters of the photometric sensor.

With OptiLine 6, e.g., the following applications are possible:

- All complexometric titrations of metals such as calcium, magnesium (total hardness), zinc, copper etc.
- All titrations with color indicator, which are prescribed in the Ph.Eur, USP, and further pharmacopeials. These titrations can now be performed automatically.
- Turbidity titration of Chondroitin sulphate according to Ph.Eur and USP
- Titration of Total Acid or Bases Number (TAN and TBN) using the color indicator method.
- Determination of carboxyl end groups in polyethylene terephthalate (PET)



TitroLine® 7800 with OptiLine 6



Titration curve: TAN acc. to ASTM D974