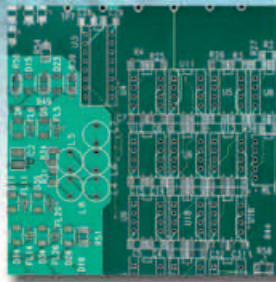


# TitraLab<sup>®</sup> Titration Workstations

Environment/Water - Food/Beverage - Petrochemistry - Chemical/Plating  
Pharmaceutical/Cosmetics/Biotechnology

Titration  
customised to *YOUR*  
exact application



# The TitraLab<sup>®</sup> Concept

## Why do we use titration?

It can be essential to know the exact concentration of a chemical species or molecule in raw materials or products in order to ensure the efficiency of a manufacturing process and the quality of the finished goods. Among the many techniques available, titration is commonly selected because of its ease of implementation, cost-effectiveness and accuracy. As it is well suited to a wide range of applications and concentrations, it has been adopted as a standard technique in a variety of industries such as water quality, pharmaceuticals, petrochemicals and food and beverage.

Whatever the application, productivity and traceability are of paramount importance. Automation of routine titration increases analysis throughput and secures the consistent quality of results and integrated documentation functions ensure compliance with Good Laboratory Practice.

Radiometer Analytical's TitraLab range is designed to satisfy this demand with systems ranging from simple routine titrators for basic applications to high-performance customised set-ups with sample changers and dedicated software.

2

## Contents

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This catalogue gives an overview of how TitraLab can meet your titration requirements. Detailed individual brochures are available for each instrument. To see what TitraLab provides for your particular application, visit us at



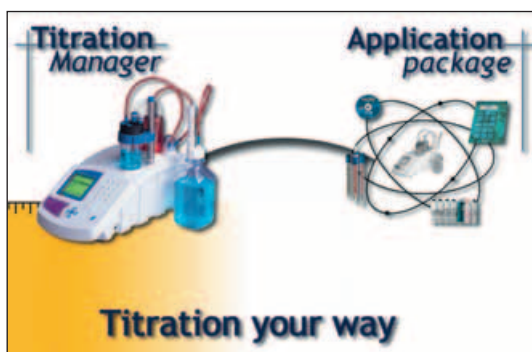
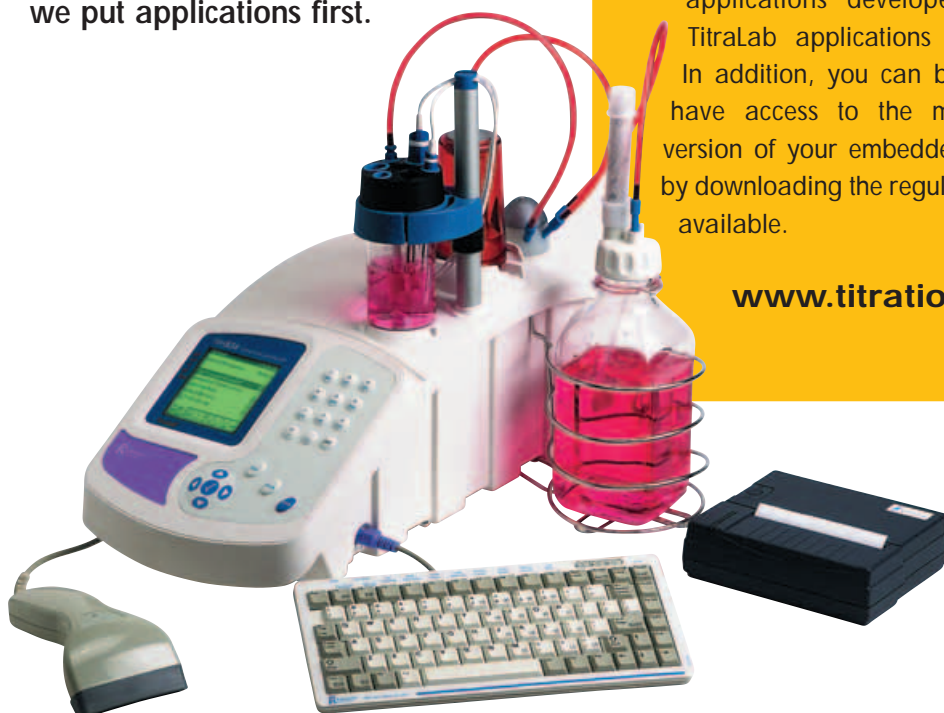
## What is TitrLab?

TitraLab is a complete solution providing all the elements required to build workstations customised to individual applications: Titration Managers, sample changers, software, electrodes, solutions and accessories.

Accuracy, traceability, reliability and ease of use are all key features of our instruments. Clear-text menus simplify programming and large displays with real-time curve plotting allow you to check everything is running smoothly at a glance. Alphanumeric entries and detailed printouts make it easy to follow Good Laboratory Practice.

The TitraLab concept goes beyond the instruments themselves. We have put our 70 years' experience in electrochemistry to good use. TitraLab includes dedicated packages for your application ready to use straightaway: instrument, electrodes, specific accessories, pH calibration and maintenance solutions and, of course, methods and application notes. The only thing you have to supply is the sample!

**At Radiometer Analytical,  
we put applications first.**



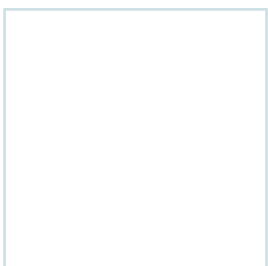
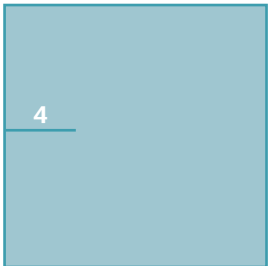
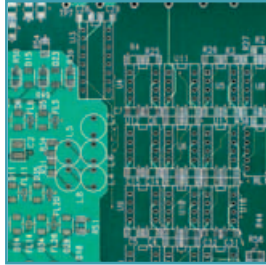
### *TitraLab Resource Centre*

TitraLab customers enjoy all-round support from our world-wide network of distributors. This includes advice on the right product for your application, assistance in installation and training and comprehensive metrology services.

As a TitraLab user, you can take advantage of our on-line Resource Centre. You will find useful literature on theoretical and practical topics and the latest applications developed by our TitraLab applications laboratory. In addition, you can be sure you have access to the most recent version of your embedded software by downloading the regular up-dates available.

[www.titration.com](http://www.titration.com)

# A Workstation for Every Application



## - Dedicated packages

- pH + acidity + free and total  $\text{SO}_2$  in wine
- pH + acidity + chloride in condiments
- pH + acidity + formol index in fruit juice and soda
- pH and alkalinity in water
- Acid/base determinations in plating baths
- Redox determinations in plating baths
- Peroxide number in edible fats and oils
- Chloride in milk, butter and other dairy products
- Ascorbic acid determination in food and beverages
- Water hardness, calcium and magnesium determination
- TAN and TBN, bromine number and bromine index according to ASTM
- Mercaptans according to ASTM

## - Technique-based packages

- Conventional acid/base titration for equivalence point of  $\text{pH} < 9$
- High-alkalinity acid/base titration for equivalence point of  $\text{pH} > 9$
- Argentimetric titration (halides and silver)
- Redox titration (zero and imposed current)
- Acid/base titration in non-aqueous media
- Complexometric titrations
- pH-Stat titration for standard volumes from 8 to 100 ml
- pH-Stat titration for micro volumes from 0.5 to 9 ml

## - Choose the right workstation for your application

Branch of Activity	Typical Applications	Ideal TitraLab workstation
Environment/Water	pH/mV, Alkalinity	840
	+ Hardness, Calcium/Magnesium, Chloride	865
	+ Conductivity, Fluoride	870
Food/Beverage	pH/mV, Chloride, Aqueous acid/base titration, Free & total SO <sub>2</sub> , Formol index	840/845
	Moisture determination	55
Pharmaceutical/ Cosmetics/ Biotechnology	pH/mV, Complexometric titrations, Redox titration, Aqueous and non-aqueous acid/base titration	960/965/980
	pH/mV-Stat	854/856
	Moisture determination	55/980
Petrochemical	mV, TAN, TBN, Sulphur and Mercaptans, Bromine/iodine index	840/845/960/965/980
	Moisture determination	55/980
Chemical/Plating	pH/mV, Acid/base titration, Redox	840/845/960/965
	Moisture determination	55

## - Choose the right workstation for your technique

Workstations: TitraLab	55	840	845	854	856	865	870	960	965	980
Monoburette	✓	✓		✓				✓		
Biburette			✓		✓	✓	✓		✓	✓
Detachable stand								✓	✓	✓
pH/mV End Point determinations		✓	✓	✓	✓	✓	✓	✓	✓	✓
pH/mV Inflection Point determinations		✓	✓			✓	✓	✓	✓	✓
pH/mV Stat titration				✓	✓					
Volumetric Karl Fischer	✓									✓
Conductivity measurements							✓			
ISE measurements							✓			

# Potentiometric Titration Workstations

## - Ready for immediate analysis!

No more wasting time setting up. Order your TitraLab system incorporating a high-performance single or biburette Titration Manager with the appropriate application package and it will arrive with all you need. Getting started couldn't be simpler:

### Communicate intelligently

#### Wireless burette stand communication simplifies GLP compliance

The latest additions to the TitraLab range communicate with their detachable burette stands via wireless RFID technology. Stand changeover is fast and reliable thanks to instant data recognition which ensures you use the right reagent with the right data every time.

### Save time and energy

#### Intelligent design ensures effortless setup and maintenance

Electrodes and tubing slot securely in place in one easy movement thanks to our unique bayonet concept. For convenient installation and maintenance, the mono-block titrating burette is mounted in no time.

### Follow simple instructions

#### Intuitive interface guides you at every step

The Titration Managers prompt you with clear-text messages in a choice of languages, making it so much easier when you're doing routine work.

### See key data at a glance

#### A large graphic display gives an instant view of results and analysis status

The titration curve is easy to follow live on the large graphic display together with important data such as the flow rate, time and dispensed volume. All parameters are displayed in clear text and results can be seen at a glance. Electrode and titrant status are visualised using easily recognisable icons.

### Get measurements right first time

#### Versatile programming and a high-resolution burette ensure speed and accuracy

Radiometer Analytical's Titration Managers provide you with flexibility to adapt your methods to your needs. Automatic sequencing and repetition of measurements are ideal for programming a direct measurement followed by a titration on the same sample or including a calibration in a series of analyses. For greater control, QC intervals can be defined. The titrating burettes offer the highest resolution on the market giving unbeatable accuracy for your potentiometric titrations.

### Stay in control

#### Assistant function and extensive data storage give complete confidence in your results

You can ensure your analysis stays on track thanks to an embedded assistant mode which guides you through operations such as calibration or reagent installation as well as graphic icons that indicate calibration status. An extensive non-volatile memory saves your current application methods and lets you check the last results obtained. When you select a method from the library, the required electrode and reagents are displayed so there is no risk of error.

### Think of tomorrow

#### Customisable design meets your future needs

All interfaces are standard so you can adapt your system as and when you wish with a sample changer, standard PC keyboard and/or bar code reader or a PC with TitraMaster 85 Software. You can add up to 4 burette motors and 4 electrode inputs by connecting two ABUxx Biburettes.

pH  
mV  
°C  
EP  
IP



TitraLab 840/845

Routine  
Titration Workstations

pH  
mV  
°C  
EP  
Stat



TitraLab 854/856

Stat  
Titration Workstations

pH  
mV  
°C  
EP  
IP



TitraLab 865

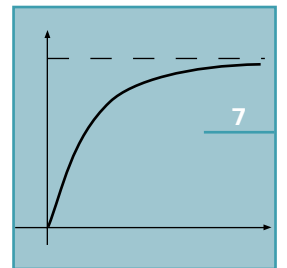
Potentiometric  
Titration Workstation

pH  
mV  
°C  
EP  
IP  
EC  
ISE



TitraLab 870

Combined Conductivity  
and Potentiometric  
Titration Workstation



pH  
mV  
°C  
EP  
IP



TitraLab 960/965

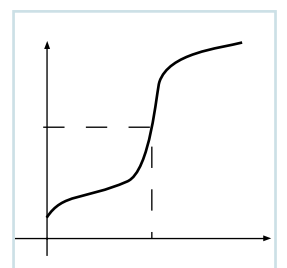
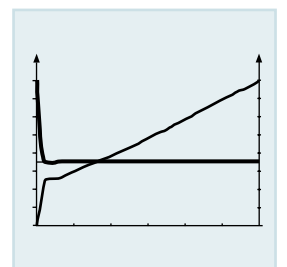
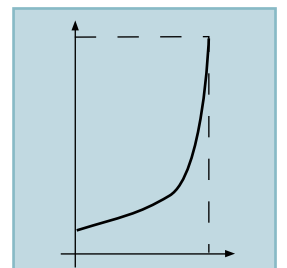
Potentiometric  
Titration Workstations  
(detachable stands)

pH  
mV  
°C  
EP  
IP  
KF



TitraLab 980

Volumetric KF  
and Potentiometric  
Titration Workstation  
(detachable stands)

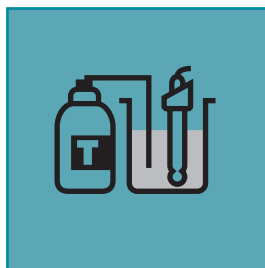
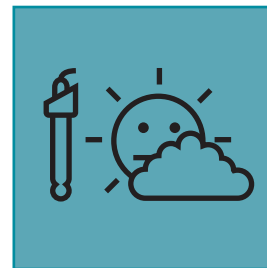
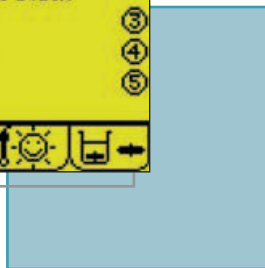
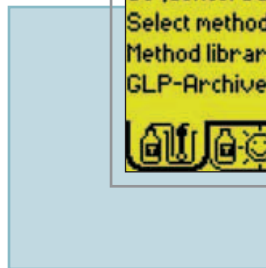
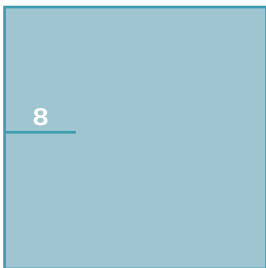


# Potentiometric Titration Workstations

## - A new user interface...

The Titration Manager interface has been designed to prompt you through every step of programming and running an analysis. You will find that operating your titration unit has never been simpler:

- Alphanumeric keypad allows entry of data and parameters.
- Large graphic display gives detailed overview of each function.
- Animated icons show information on titration status.
- Keypad numbers provide shortcuts to functions.
- Active on-line help guides operator in setting up the system.

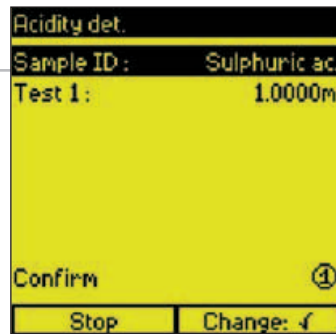


...to guide you every step of the way



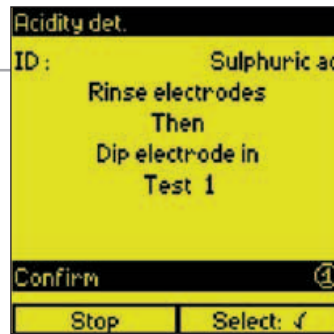
1

Select your method.



2

Enter sample ID and quantity.

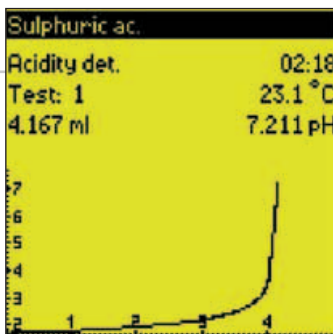


3

Prepare your sample.



9



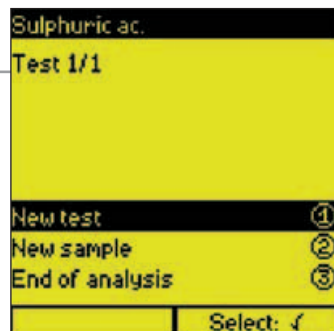
4

Keep an eye on the titration in progress.



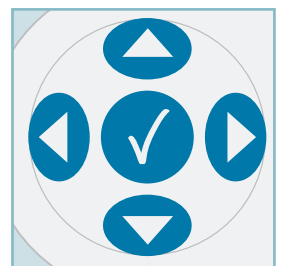
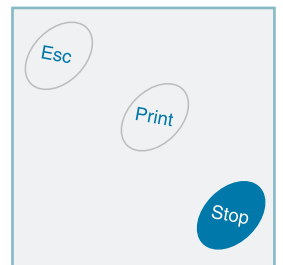
5

Archive your result.



6

End or repeat your analysis.



# Potentiometric Titration Workstations

## - Technical specifications

TitraLab	840	845	854	856	865	870	960	965	980
<b>Techniques</b>									
pH/mV measurements	✓	✓	✓	✓	✓	✓	✓	✓	✓
End Point titration	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inflection Point titration	✓	✓			✓	✓	✓	✓	✓
pH-Stat titration			✓	✓					
Volumetric Karl Fischer									✓
Conductivity measurements						✓			
ISE measurements						✓			
<b>Titrant addition techniques</b>									
Continuous dynamic		✓		✓	✓	✓	✓	✓	✓
Incremental monotonic & dynamic		✓		✓	✓	✓	✓	✓	✓
<b>Burette</b>									
Detachable burettes							✓	✓	✓
Number of titrating burettes	1	2	1	2	2	2	1	2	2
Burette volumes (ml)	1, 5, 10, 25, 50								
Additional titrating burettes	Up to 4 with 2 x ABU52						Up to 4 with 2 x ABU62		
<b>Extension/Module</b>									
Sample changer	✓		✓	✓	✓	✓	✓	✓	✓
Balance	✓		✓	✓	✓	✓	✓	✓	✓
Printer	✓		✓	✓	✓	✓	✓	✓	✓
PC software	✓		✓	✓	✓	✓	✓	✓	✓
Peristaltic pump/TTL connections	✓		✓	✓	✓	✓	✓	✓	✓
PC keyboard and bar code reader	✓		✓	✓	✓	✓	✓	✓	✓
Built-in pump for solvent handling									✓
<b>Electrode inputs</b>									
Indicator electrode	1					2			
Reference electrode					1				
Polarised electrode					1				
Selectable polarised input	±1 mA in 1 µA steps, DC or AC								
Additional electrode inputs	Up to 4 indicator, 2 polarised and 2 reference with 2 ABU52 /2 ABU62								
Differential measurement	✓		✓	✓	✓	✓	✓	✓	✓
<b>Types of titration</b>									
Direct titration	✓		✓	✓	✓	✓	✓	✓	✓
Back titration	✓		✓	✓	✓	✓	✓	✓	✓
Blank determination	✓		✓	✓	✓	✓	✓	✓	✓
Titrant standardisation	✓		✓	✓	✓	✓	✓	✓	✓
pH electrode calibration	Up to 5 points								
Method sequencing	Up to 3 methods			Up to 10 methods in a series					
Method coupling per sample	2		8	4	6	8	8	8	8

TitraLab	840	845	854	856	865	870	960	965	980
<b>Sample list</b>									
Number of samples	Up to 20 samples		Series up to 126 samples with alphanumeric ID						
QC sample definition			✓		✓	✓		✓	✓
<b>Measuring ranges/Resolution</b>									
pH	-9 to 23 pH/0.001 pH								
mV	±2000 mV/0.1 mV								
°C	-10°C to +100°C/0.1°C								
Water content									0.1% to 100%
Conductivity						4 µS to 400 mS/cm			
<b>Results</b>									
Auto calculation	On selected result units								
User-defined equations	1	2 with user-defined result units							
QC check with visual warning			✓		✓	✓		✓	✓
Statistical calculations	✓		✓		✓	✓		✓	✓
Automatic GLP printout	3 levels of detail								
<b>Storage capacity</b>									
Pre-programmed methods	✓		✓		✓	✓		✓	✓
Global password protection	✓		✓		✓	✓		✓	✓
Non-volatile memory	✓		✓		✓	✓		✓	✓
User-programmable methods	10	50 including pre-programmed methods							
Electrode library	15	30 including pre-programmed electrodes							
Reagent library	15	30 including pre-programmed reagents							
Pre-identified electrodes	A catalogue of up to 30 electrode names and characteristics								
Pre-identified titrants	A catalogue of up to 20 reagent names								
Results storage	60	Up to 200 sample results, 100 electrode + 100 reagent calibrations							
<b>Electrode stand/Stirring</b>									
Magnetic stirrer	✓		✓		✓	✓		✓	✓
Propeller stirrer connection	✓		✓		✓	✓		✓	✓
Beaker volume	5 to 400 ml								
<b>General specifications</b>									
Casing	Splashproof lathene								
Keypad	Alphanumeric silicone								
Display	Graphic 128x128 dot LCD								
Languages	English, French, German, Danish, Spanish, Italian, Swedish								
Dimensions (H x W x D)	380 x 230 x 450 mm								
Weight (excl. reagent bottles)	5 kg								
Power requirements	47.5-63 Hz; 115/230 Vac +15 -18%								

# Karl Fischer Titration Workstation

## - Moisture determination...

The determination of water content is essential in many industries in order to optimise processes and product shelf life. To ensure you have complete confidence in your results, the TitraLab 55 Volumetric Karl Fischer Workstation offers QC functions and built-in metrological calculations – a unique benefit. This makes it ideal for moisture determination, whatever your application.

When you order a TitraLab 55, it comes complete with the high-performance TIM550 Titration Manager together with TitraMaster 55 Software and all the accessories you need for your moisture determinations.

### **Save bench space**

The burette, pump, titration stand and keyboard are all integrated in one compact unit about the size of your laboratory notebook.

### **Ensure operator safety**

An electronically driven pump handles KF reagents. During operation, direct contact with solvents is totally avoided as the system controls cell filling and waste removal.

### **Increase analysis throughput**

The TIM550 keeps your cell dry. Automatic cell conditioning reduces downtime while continuous and intelligent cell volume monitoring prevents overflowing. Cell filling and emptying is performed in a matter of seconds.

### **Comply with QC requirements**

The TIM550 includes specific Quality Control parameter setting together with High-Low alarms to help operators make the right choice in reviewing results.

### **Document results in line with GLP**

A dedicated key gives access to all the relevant information for each sample including uncertainty, mean, date, time, operator ID, reagents and QC alarms.

### **Keep your data fully traceable**

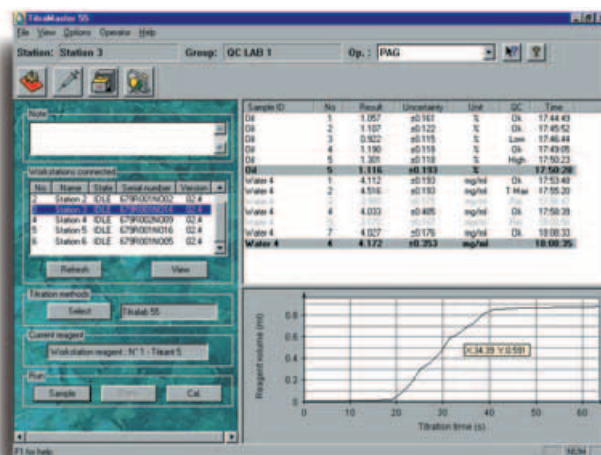
The TIM550 takes into account all parameters involved in your analyses and gives results with their related expanded uncertainty ( $k=2$ ). In addition, statistical calculations are updated after each one of a series of analyses.

### **Exploit your results to the full**

TitraMaster 55 PC Software allows you to program and run methods on the TIM550 directly from your PC. Its multitasking function makes it easy to follow analyses, check results and compile reports while analyses are in progress.



...better than ever before



13

		Specifications		
Titration methods	Volumetric KF titration	Karl Fischer cell	Minimum volume: 35 ml ±5 ml	
	KF reagent standardisation		Maximum volume: 150 ml ±5 ml	
	Blank determination		Screw type glass beaker, clear or brown, standard or thermostated	
Storage capacity/ GLP	50 methods including pre-programmed applications with alphanumeric ID and protection	Pneumatic circuit	Solvent addition and cell emptying	
	200 results		Inputs/Outputs	One electrode input & connections for Printer/PC and additional TIM550s
	10 blank determinations			Balance
Languages	English, French, German, Spanish, Italian and Danish	Printouts	Condensed and detailed GLP bulletins	
			PC keyboard and/or bar code reader	
Burette	Glass syringe, plastic cover	Dimensions (H x W x D)	380 x 230 x 450 mm (excluding tubing)	
	UV protection	Weight	5 kg (excluding bottles)	
	Titrant exchange procedures	Power requirements	47.5 - 63 Hz, 115/230 Vac +15 -18%	

# Dedicated PC Software



## - TitraMaster 85, a user friendly tool...

Handling sample throughput efficiently while keeping data securely stored for future access is an essential requirement for all laboratories. With TitraMaster 85 user-friendly titration software, you can program applications directly from the computer while processing data from as many as 7 titration workstations or high-performance ion analysers.

### Secure your system completely



#### **User logins and operator passwords prevent unauthorised access**

In TitraMaster 85 an access level is assigned to each operator together with a strictly personal login and password. Each hierarchical level gives access to specific rights and functions to protect against unauthorised use and unintentional changes.

### Program your applications conveniently

14

#### **Computer environment facilitates creation of applications**

Applications can be programmed and managed directly from the TitraMaster 85 database application window on your PC. Each application is fully traceable with a version number and a complete historical record of changes. You can reuse an existing application or return to a previous version.



### Run your applications instantly



#### **Straightforward interface allows applications to be set up in no time**

Select an application from your database, fill in the sample stack, press RUN and follow instructions. That's all there is to it. Automatic prompts guide you step by step making your analysis simpler and safer.

### Check your results at any time

#### **Immediate information on titration curves and results**

Curves and records are displayed live with clear result status icons. Data from each workstation connected can be featured in an individual window to give you an overview of analyses in progress. While analyses are running, the database can be searched by user-selectable criteria so you can process the results that matter.



### Record all your data securely



#### **Automatic archiving guarantees you never lose data**

TitraMaster 85 offers a powerful automatic archiving tool which allows you to retrieve records fast and efficiently via user-programmed requests. Each record is stored with a full set of information specifying how, where, when and by whom it was obtained.

## ...for secure and efficient data management

### Follow your result trends graphically



#### Visual control chart tool makes Quality Control easy

For all analysis results defined with acceptance limits - electrode or reagent calibration, QC sample or sample batch analysis - you can plot a control chart to keep track of progress. This ensures you obtain a clear view of trends in measuring chain performance and analytical data.

### Exploit your results to the full

#### Data processing and export functions ensure you make efficient use of your data

Your results can be recalculated and/or curves reprocessed according to your requirements with no risk of losing raw data. Data can be exported to LIMS or Microsoft Office applications in various file formats.



## Extended FDA 21 CFR Part 11 solution

Radiometer Analytical has developed a special version of TitraMaster 85 Software in order to help your laboratory fulfil its obligations regarding document submission and legally binding electronic signatures in compliance with Food and Drug Administration 21 CFR Part 11 requirements.

With the **TitraMaster 85 FDA21CFR11** version, you can be sure of:

- Electronic signatures
- System validation
- Unfalsifiable records
- Standard-format exporting
- Password protection
- Controlled access
- User accounts
- Audit trail
- Data tracking
- GLP compliance
- Secure backup
- Application traceability

The audit report of an outside organisation which examined TitraMaster 85 compliance with FDA 21 CFR Part 11 is available on request.

# Sample Changers

## - Effortless sample handling through total automation

When you are expected to handle more and more samples without increasing the number of operators or the size of your laboratory, automation is your only solution. Our SAC80 or SAC90 Sample Changers are capable of handling multiple combinations of titrations and direct measurements fast and efficiently. With a titrator and/or PC software selected from our product range your laboratory will virtually run itself!

### High sample throughput

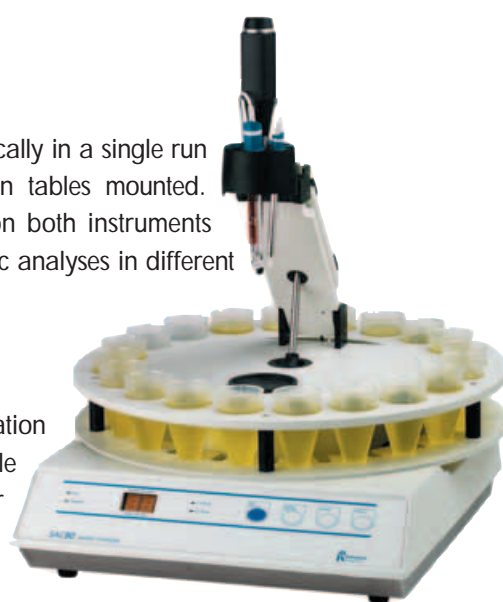
From 10 to 126 samples can be handled automatically in a single run depending on the tray and number of extension tables mounted. A wide choice of beaker volumes is available on both instruments and for greater flexibility, you can carry out specific analyses in different beakers.

### Time and cost-saving operation

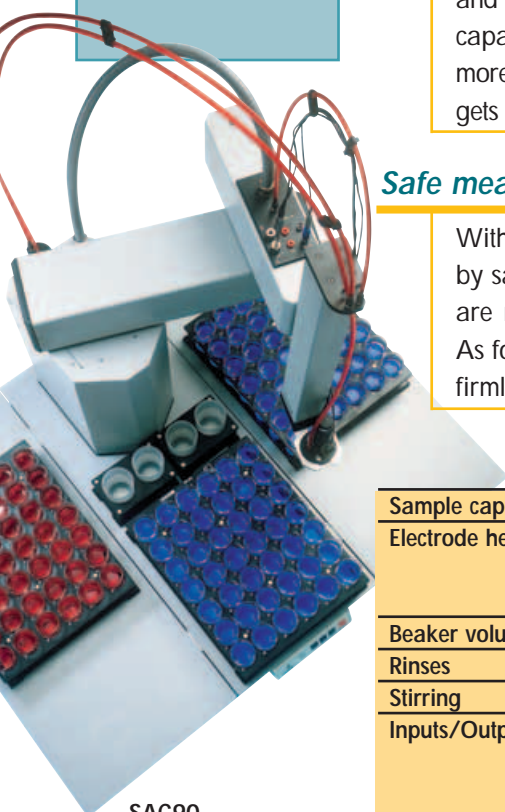
Removable trays or turntables make sample preparation and collection effortless. Thanks to a large sample capacity, valuable manpower can be released for more important tasks while the sample changer gets on with the job – day and night.

### Safe measurements

With the SAC90, contamination of new samples is prevented as the electrodes are moved by safe routes to and from the rinse beaker. Drips are virtually eliminated as the electrodes are raised slowly from a sample. Up to three rinses can be selected for further security. As for all our electrode heads, easy-slot bayonet sockets keep all electrodes and accessories firmly in place.

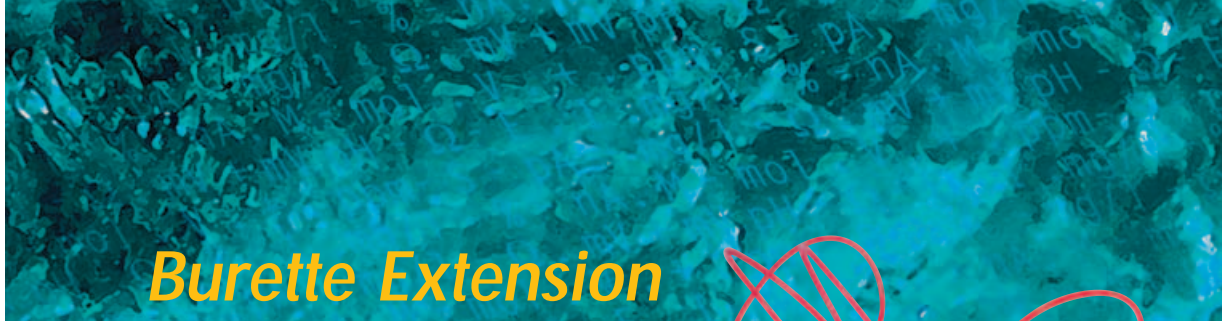


SAC80



SAC90

	SAC90	SAC80
Sample capacity	From 12 to 126 samples	From 10 to 20 samples
Electrode head capacity	Maxi: 6 x 12 mm	
	Macro: 3 x 12 mm + 3 x 7.5 mm	
	Standard: 2 x 12 mm + 3 x 7.5 mm	
Beaker volumes	From 50 to 250 ml	From 50 to 400 ml
Rinses	1, 2 or 3 rinses with 1 park position	1, 2 or 3 rinses
Stirring	Propeller stirrer	
Inputs/Outputs	RS232C serial interface for control unit	
	Power socket for propeller stirrer	
	2 x BNC sockets for electrodes and temperature sensors for signal transmission to final input	
Dimensions (H x W x D)	1200 x 485 to 1010 x 1050 mm	470 x 410 x 480 mm
Weight	29 kg	12 kg
Power requirements	47.5 – 63 Hz, 65 VA	47.5 - 63 Hz, 34 VA
	100/240 Vac ±10%	115/220 Vac ±15%



# Burette Extension

## - Customise your system to every application

The ABU52 and ABU62 Biburettes come complete with all necessary accessories. Extending your system couldn't be simpler:

### Add extra capacity

Each ABU52 or ABU62 gives you two motor-driven burettes, two electrode inputs and one temperature input. Two ABU52s and ABU62s can be connected to a Titralab workstation, providing up to six titrating burettes and six high-impedance electrode inputs in one system, meeting every application need. Use the ABU52/62 as an extra titration sample stand or for electrode storage and reconditioning.



### Automate your system

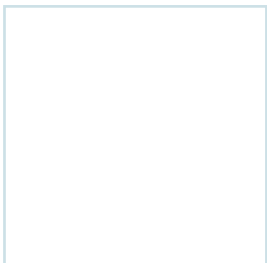
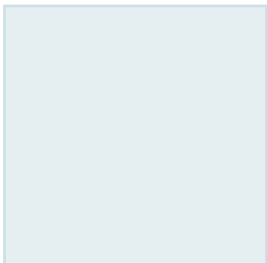
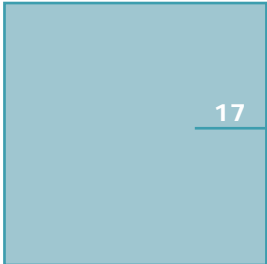
The required ABU52/62 burette and installed electrode are selected via methods programmed in the titration workstation, with the system taking charge of precise titrant or reagent dispensing. The large screen display gives you information about reagent status at a glance.

### Ensure fast and accurate dispensing

Choose from five monoblock burette sizes: 1, 5, 10, 25 and 50 ml, all conforming to the ISO 8655-3 standard. The full volume can be dispensed in less than 20 seconds, with a resolution as small as 0.1 µl with the 1 ml burette.

### Use as a stand-alone dosing unit

The ABU52 can be operated manually by simply connecting a standard PC keyboard. Just fit the right electrode and the ABU52 becomes a versatile manual titration unit. mV/pH readings are shown on the large screen for each titrant increment dispensed along with a live titration curve. Graphic tools enable you to determine the location of your equivalence point(s) manually in order to calculate the final result.



Burette specifications according to ISO 8655-3

Burette stand Type		Nominal volume ml	Maximum permissible systematic errors		Maximum permissible random errors	
Fixed	Detachable		± %	± µl <sup>a</sup>	± % <sup>b</sup>	± µl <sup>c</sup>
B501	B601	< 1	0.6	6	0.1	1
B505	B605	5	0.3	15	0.1	5
B510	B610	10	0.2	20	0.07	7
B525	B625	25	0.2	50	0.07	17.5
B550	B650	50	0.2	1 00	0.05	25

<sup>a</sup> Expressed as the deviation of the mean of a tenfold measurement from the nominal volume or from the selected volume (see ISO 8655-6:—, 8.4).

<sup>b</sup> Expressed as the coefficient of variation of a tenfold measurement (see ISO 8655-6:—, 8.5).

<sup>c</sup> Expressed as the repeatability standard deviation of a tenfold measurement (see ISO 8655-6:—, 8.5).

# Accessories

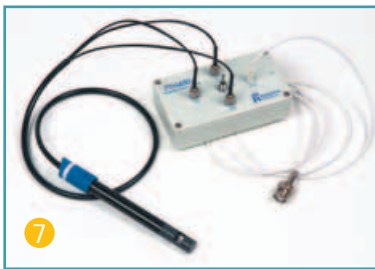
As TitrLab is a complete solution, we provide all the options required to configure a workstation customised exactly to your application.

TitraLab workstations come complete with a full set of connecting cables, cell accessories, one or two burettes (6) and a comprehensive documentation kit (4) including application notes, a titration theory and practice booklet and practical plastified short-form instructions to guide you through daily tasks.

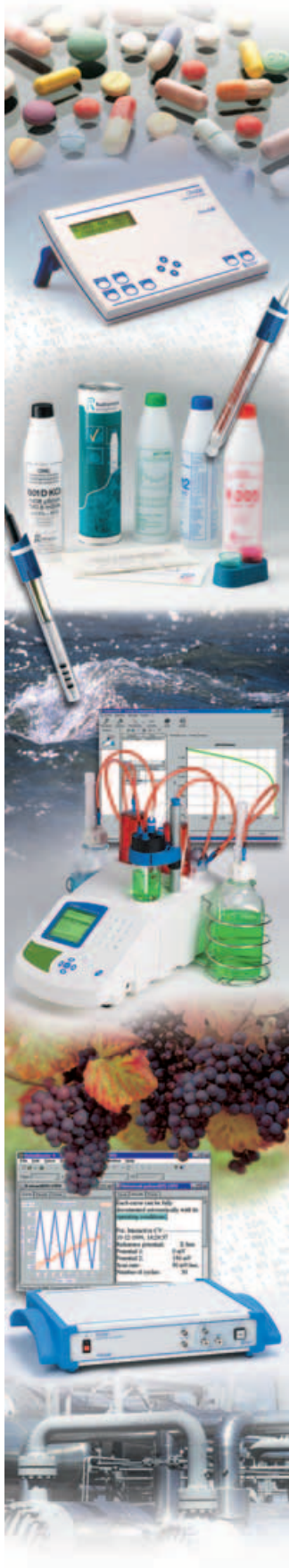
In addition to sample changers and software, TitrLab includes a wide range of dedicated accessories to complete, maintain and expand your workstation.

- 1 A complete range of dedicated titration electrodes: acid/base, complexometry, precipitation (silver titration, surfactant), redox
- 2 Certified pH calibration solutions
- 3 Electrode maintenance kit
- 4 Documentation kit
- 5 Propeller stirring kit
- 6 Fixed or detachable burettes
- 7 Photocolorimetric probe
- 8 Thermostated cells
- 9 Notebook keyboard and bar code reader
- 10 Dot matrix and thermal printers





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## Leading the field in electrochemistry

Radiometer Analytical SAS develops, manufactures and distributes an extensive range of electrochemical systems dedicated for routine testing, research and teaching in the laboratory and on the plant.

By supplying instruments, software, sensors and calibration standards, Radiometer Analytical SAS masters the complete measuring chain. Our customers obtain a reliable result at reasonable cost thanks to all-in-one systems that are easy to use and maintain.

The company enjoys a reputation for excellence in the following fields:

**pH, ion and conductivity measurements:** complete systems for reliable measurements in the field and in the lab including a wide choice of instruments, sensors and standards.

**Titration:** workstations customised to individual applications including titrators, sample changers and dedicated software.

**Voltammetry:** all-in-one systems for electrochemical

measurements including potentiostats, impedance meters and powerful software making use of techniques such as voltammetry, amperometry, coulometry, polarography and EIS.

Radiometer Analytical SAS has been building its expertise for seventy years since the company pioneered its very first pH meter in Copenhagen, Denmark. It was strengthened by the acquisition of Tacussel, another leading name in electrochemical instrumentation. More recently Radiometer Analytical SAS joined the Danaher Corporation.

Based in Lyon, France, Radiometer Analytical SAS is represented throughout the world by a network of experienced, factory-trained distributors, who can offer comprehensive applications and after-sales service.

Radiometer Analytical SAS is ISO 9001 certified. In addition, our Reference Materials Laboratory is accredited by COFRAC (Comité Français d'Accréditation) for the calibration of reference materials in pH and conductivity (Accreditation No. 2.1418).

## Reliable and longlasting electrodes The Radiometer Analytical secret

Radiometer Analytical offers a range of more than 300 electrodes - combined pH, glass or reference electrodes, metal electrodes, ion-selective electrodes and conductivity cells - for every application and budget. Electrodes are manufactured on our premises in Villeurbanne, France using a combination of traditional know-how and state-of-the-art technology.

It takes between 2 and 11 days to manufacture a combined pH electrode, depending on the type. The most spectacular stage of the process is the blowing of the glass bulb from a blob of molten glass heated to 1200°C.

To find out just what goes on behind the scenes when a combined pH electrode is manufactured, ask for a free copy of this informative illustrated article or download it from our web site:

<http://www.radiometer-analytical.com/TTL7>.



Preparing the stem for dipping



Dipping in molten glass



Blowing the glass bulb



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