902 Titrando

Intelligent potentiometric titrator
STAT titrator and synthesis controller

Metrohm

STAT titrator and synthesis controller

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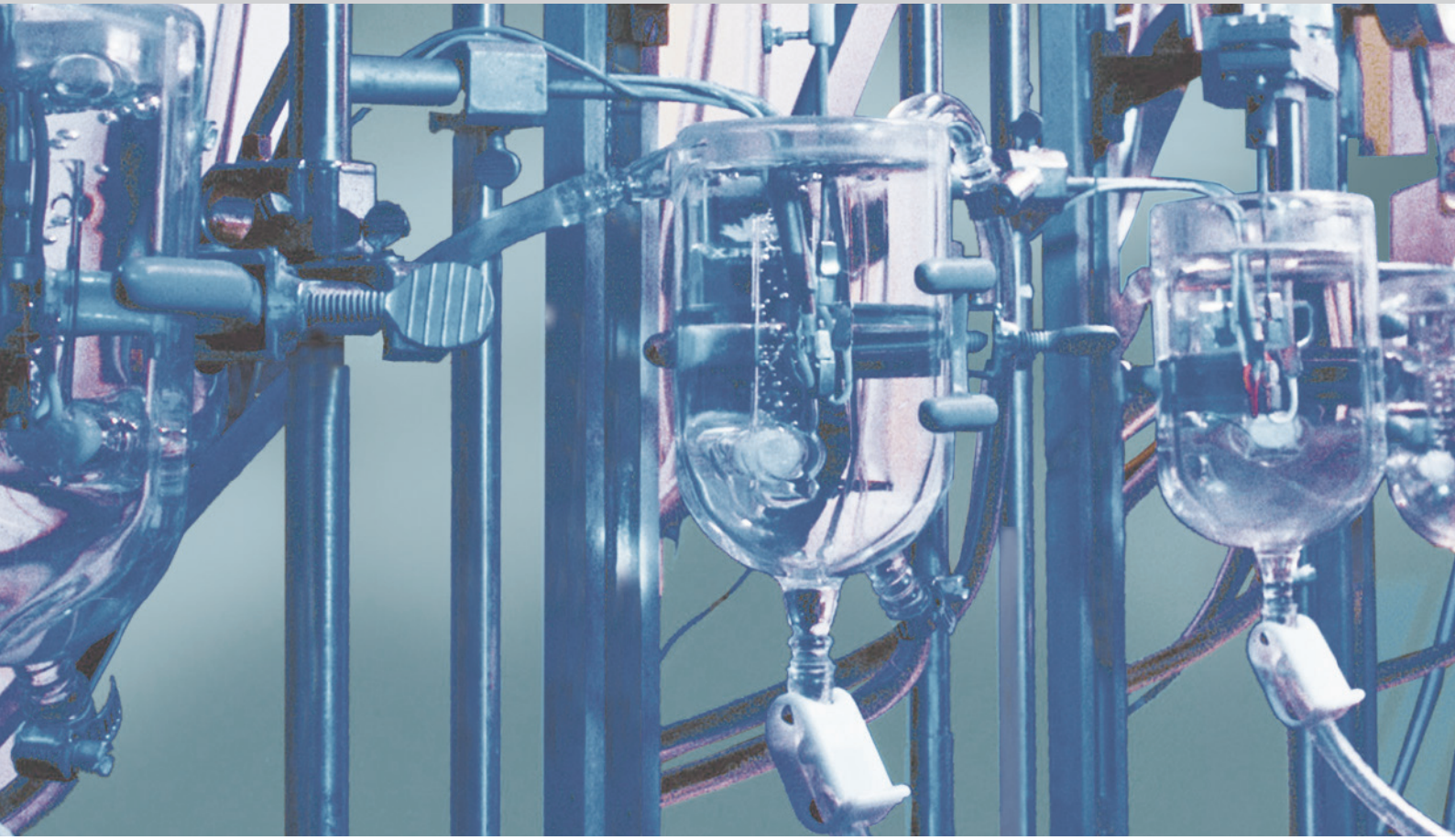


Highlights

- One touch titration – favorites for method shortcuts
- iConnect – mobile measuring input with digital data transmission
- iTrodes – intelligent sensors for automatic electrode recognition
- GLP-compliant electrode test
- Intelligent dosing elements
- Potentiometric STAT titration
- Sample Processor control
- Client-server database with ***tiamo***
- Parallel titration with ***tiamo***
- Direct network access with 900 Touch Control
- Liquid handling with the patented Dosino
- Complies with GMP/GLP and FDA Regulations such as 21 CFR Part 11
- USB interfaces for sample changer, printer, PC keyboard, barcode reader ...

Dosing à la carte

The space-saving Dosino

Basically, titration is all about dosing intelligently. With the Titrando system, the patented Dosino with its Dosing Unit can be mounted directly on the reagent bottle. This means that dosing requires no additional bench space. Thanks to adapters, any reagent bottle can be used directly.

The Dosino houses state-of-the-art electronics and micromechanics. The Dosing Unit can be exchanged within seconds. Thanks to its transparent housing, any bubbles that may be present in the dosing cylinder can be seen and eliminated immediately, and the valve position is always shown. Rinsing and preparation of the Dosing Unit can be carried out automatically; manual dismantling and rinsing are not necessary.

Smart dosing elements with certification

The Dosing Units set new standards with regard to reliability. Intelligence «en miniature» in the form of a Data Chip makes this possible. This chip is present in every 807 Dosing Unit. The Titrando automatically reads from it all the data that it needs to carry out the titration properly, i.e. type of reagent, titer, last titer determination, shelf life data and much more.

In addition, the Titrando compares the data it has obtained with the selected method and carries out a plausibility test. If the result is negative, a clear error message appears.

Details

	807 Dosing Unit
Standard bottle thread	GL45
Adapters for bottle threads (option)	S40, 40 mm, 32 mm, 28 mm
Buret cylinders available	2, 5, 10, 20, 50 mL
Surface area needed for two dosing elements	150 mm x 240 mm
Flat stopcock made of	Ceramic
Cylinder made of	Glass for titrants ETFE for auxiliary solutions and aggressive media

iTrodes with 854 iConnect – the smartest sensors around

Metrohm iTrodes – electrodes with a brain
The electrode used for the titration is the most important component of any titration system. Until now the electrode was the last gap in traceability. The Titrando with 854 iConnect now closes this gap and therefore guarantees complete traceability of the analytical result to each component of the analytical system.

854 iConnect – Measuring input «on a chip»
Thanks to the most advanced electronics Metrohm has been able to reduce the measuring input to the size of a postage stamp. This means that the complete measuring input fits in the electrode cable head (the 854 iConnect). It is automatically recognized and identified by its serial number.

Digital data transfer
Directly at the sensor, the the analog measuring signal is converted into binary code by the the 854 iConnect. Due to the digital transmission of the data the measuring signal is no longer susceptible to electrostatic influences. Interference-free transmission can now always be guaranteed, no matter how long the electrode cable is.

Just take the measuring input with you!
With the 854 iConnect the sensor and measuring input are always calibrated together; the calibration data is stored in the intelligent electrode. As the measuring input is no longer built into the instrument, the electrode and 854 iConnect can be used with different titrators. The calibration procedure is no longer restricted to a particular titrator.

Digital identification – no more mix-ups

The built-in memory chip allows the storage of such important sensor data as article and serial numbers, calibration data, calibration history, working life and calibration validity period.

All sensor data is read in automatically when the iTrode is connected to the Titrando. Mix-ups or editing errors are therefore eliminated.

The electrode is identified automatically. If the type of electrode is not the same as that defined in the method then the user is informed. Thus, it is not possible to use a wrong electrode.

Storage of calibration data – no chance for outliers

Monitoring functions allow the exclusion of electrodes whose calibration data lies outside the limits or whose calibration period has expired.

If the sensor is used with different instruments or if you wish to prevent inexperienced users from having to calibrate the electrode on their own instruments then the electrode can be calibrated on a different instrument under defined conditions. The calibration data stored in the chip makes the electrode transferable; it does not need to be recalibrated each time that it is used with a different instrument.

Compatible with all existing sensors

Despite its new digital measuring interface and intelligent sensors, the Titrando with combined analog and digital measuring input also supports conventional sensors.

The Titrando System at a glance

Due to its modular design the Titrando System can be adapted to any application. It meets the requirements of FDA Regulation 21 CFR Part 11. Benefit from the system's intelligence and communication capabilities!

The Titrando accelerates method development and simplifies routine operation.

The Data Chip of the Exchange Unit and Dosing Unit contains all important titrant data. The intelligent sensor «iTrode» prevents the use of a wrong or expired electrode.

The large color screen of the 900 Touch Control operating unit keeps you informed about the instrument condition and offers uniquely comfortable operator guidance.

iConnect and iTrodes – digital data transfer and automatic electrode recognition. The Data Chip of the intelligent sensor contains all important sensor data.

NEW: The automatic GLP-compliant electrode test allows an objective evaluation of the electrode and leaves nothing to chance. Reliable and reproducible results are guaranteed.

Numerous ready-to-use methods and titration examples make familiarization with the system easy. Method templates and calculation formula templates are available for developing your own methods.

Optimal reagent handling by either Exchange Unit or Dosing Unit.

More intelligence: The Data Chip of the Exchange Unit or Dosing Unit contains all important titrant data.

The 900 Touch Control provides access to your Intranet. Print your reports on a network printer,or save your data on a USB stick.

When combining the ***tiamo*** software and the Titrando, you benefit from a Client-Server database.

Parallel titration – using the ***tiamo*** software, your Titrando can work with two titration cells in parallel.

Your Titrando System can be fully automated, including sample preparation (weighing, homogenization, filtration, pipetting).

Superior intelligence – easy to operate

Favorites for quick method start

Methods can be linked to a «Favorite» icon on the starting screen of the 900 Touch Control operating unit. You can start titrating by pressing just a single button!

Using our methods you benefit from Metrohm's many years of experience in titration. All titration methods developed on Metrohm Titrinos can be automatically converted into Titrando methods using a PC.

Store your methods, sample data and results using either the Touch Control operating unit, a USB stick or a PC. This provides for complete storage security, prevents method or data loss, and also increases operational security.

Intelligence for more transparency

Operating your Titrando System is simple and intuitive. The following features further simplify using your Titrando:

- The «Quick Access» function (direct parameters) gives you direct access to the parameters required for the given application. You do not have to click your way through different operating levels any more. «Quick Access» is invaluable for routine analysis.
- The «Help» fixed key shows a context-related help text in the display.
- The «Follow me» help function is available when working with a PC. Continuous explanations about the current surroundings are given in a separate window and further possible procedures are indicated.
- The standard user methods can be modified to suit your particular requirements. Method templates and calculation formula templates are available for developing your own methods. Methods can be stored under meaningful names (32 characters) and structured directories can be used; this makes sorting, identification and searching much easier.
- Whereas in the expert dialog all settings are available, the routine dialog can be freely configured to meet the requirements of the particular user. Thus, users can load their «profiles» from a personal keycard and see only those operating elements that they actually need.

The Titrando puts an end to puzzling out the meaning of coded error messages. It tells you exactly where the error is using plaintext. Moreover; it suggests suitable measures for troubleshooting.

Start your titration at the push of a button: Routine methods can be linked to a «Favorite» icon on the starting screen of the 900 Touch Control.

The Titrando in the modern laboratory

Data management is knowledge management
Data must always be available: for direct information, for transfer to a data system, for further processing or for an audit. The data that your Titrando System provides you with can be printed out and stored in a conventional manner. However, the complete range of modern data management is also available, for example storage on a USB stick that is simply inserted in the 900 Touch Control.

When you work with ***tiamo***, you can use all the storage options offered by the PC world, for example hard drives, network drives, servers, Intranet ... If required, your Titrando generates a machine-readable PC/LIMS report.

Ethernet connection
If you want to connect your Titrando system directly to a higher data system, there is nothing in the way: the 900 Touch Control opens up internal networks (Intranet, LIMS[1], LAN[2]) to the Titrando. Network printers can be used for printing reports.

Never has integration into your LIMS structure been so easy!

PDF reports at the touch of a button
Using the PDF generator, you can edit, store, and print forge-proof analysis reports as PDF files at the push of button.

14 favorites per user for fast method access
Up to 14 favorite icons per user can each be linked to a method on the start screen of the 900 Touch Control. Thus, you have instant access to your most frequently used methods and start them at a single touch of an icon.

[1] LIMS = Laboratory Information Management System
[2] LAN = Local Area Network

Compatibility and traceability

GLP, GMP, and 21 CFR Part 11 are becoming increasingly important in the modern laboratory. The Titrando System is entirely oriented towards quality management in the laboratory and offers the following possibilities:

- Each time that it is switched on the Titrando System carries out a self-diagnosis.
- If programmed accordingly, the instrument will remind you about any validation or service work that is due.
- You can enter limits for results; their observance will be checked for each determination.
- The titer of the titrant can be monitored as a function of time in both tabular form or as a graph, similar to a control card.
- The calibration history of the sensors can be called up. This means, for example, that alterations to the sensor caused by aging can be recognized before they affect results.
- All changes to the data are documented; traceability is guaranteed.

Your Titrando enables strict control of rights of access using login and password. The requirements defined in FDA Regulation 21 CFR Part 11 regarding «electronic signature» and «electronic record» are fulfilled both in the stand-alone system using the Touch Control operating unit and in the version controlled via PC. This also applies to the other points stipulated in this regulation, i.e. the protection of electronic records against accidental or intentional alteration and the complete traceability of results. The Titrando with Touch Control is the only stand-alone titration system with audit trail.

Quality management at Metrohm

Quality has always been extremely important for Metrohm. On November 5, 1993 our company was rewarded the ISO 9001 certificate of quality. The Metrohm quality management system is continually being perfected and checked by both internal and external audits.

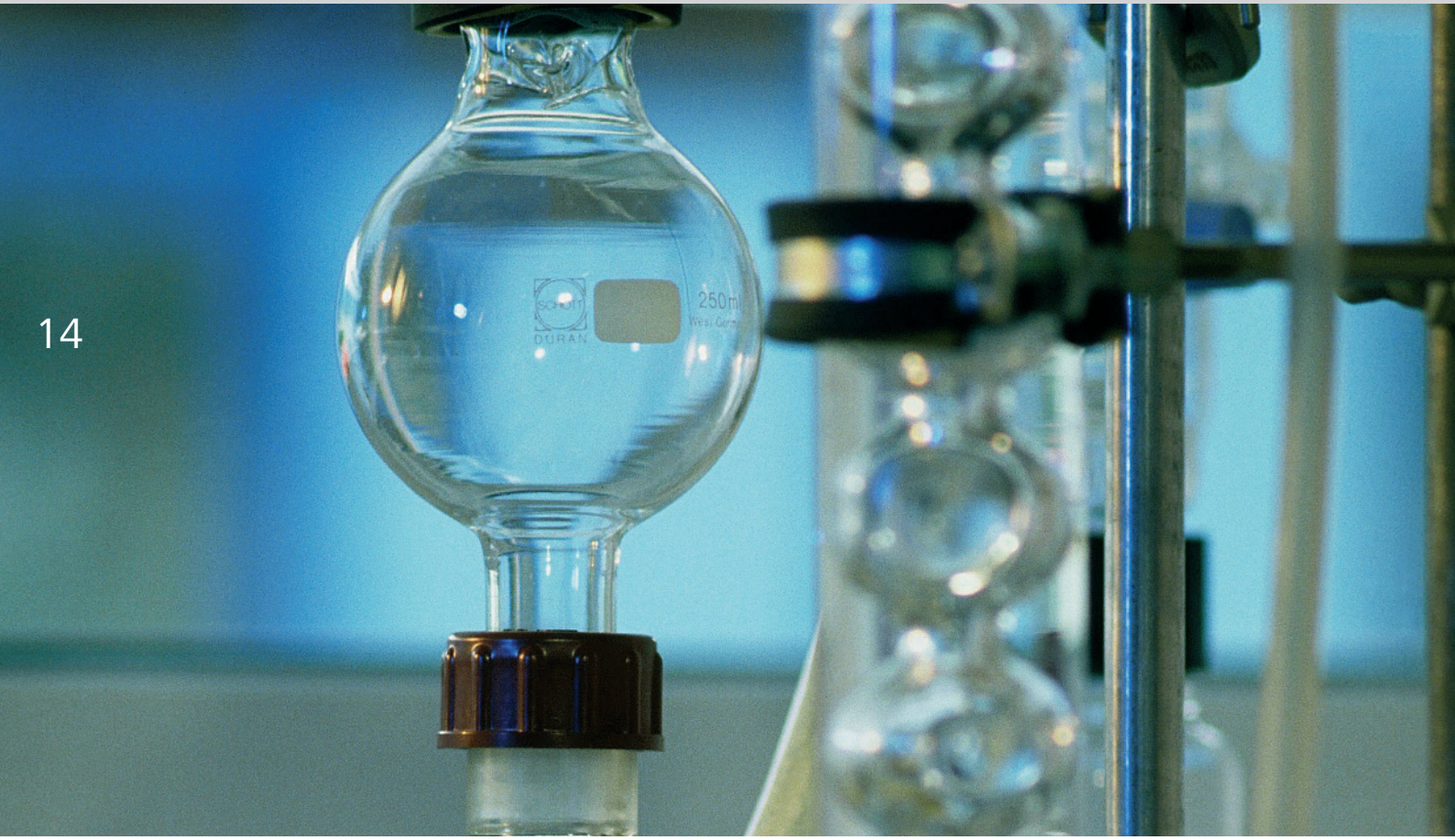
Integrated Automation

Perfectly modular design

The possibilities for upgrading the Titrando System are amazing. First the bare figures: The basic unit consists of a Titrando with one measuring in ter face. This basic unit can be upgraded to form a super-titrator that controls 12 burets and boasts 6 galvanically separated measuring interfaces. Between these two extremes lies the whole spectrum of Titrando possibilities. Among them you will certainly find a Titrando System that meets the de mands of your particular application. Your Titrando System meets ever new and more complex challenges as it can be up-graded at any time.

Automation pays dividends

Increasing sample numbers, time-consuming sample pre-paration steps and unattended overnight operation are good reasons for using sample changers. The Titrando has the necessary intelligence to control sample changers and offers – in combination with the 814 USB Sample Processor and 815 Robotic USB Sample Processor XL – a high degree of automation at moderate costs.



STAT titration

The determination of enzyme activity (lipase, trypsin, etc.) or of the release kinetics of antacid tablets requires a titrator that rapidly adjusts to a preset pH value and keeps it constant for a long period. The controller of the Titrando has been optimized for this task and is one of the best on the market. It can also be used to determine the kinetics of acid-base or redox reactions.

Tandem dosing
Tandem dosing is a feature that prevents dosing interruptions when the buret is refilled during the titration – a second buret immediately takes over. Thus, rapid reactions with a high reagent consumption can be monitored with maximum accuracy. Tandem dosing is also available for simple and monitored dosing.

The Titrando in the synthesis laboratory

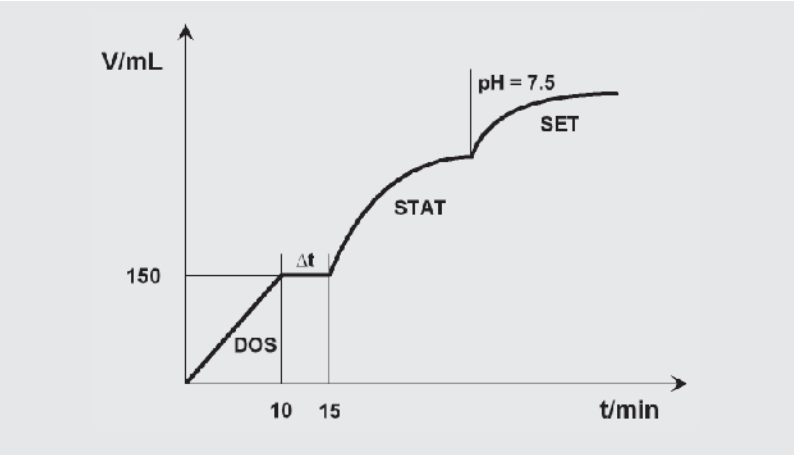
In the synthesis laboratory different challenges are faced to those encountered in titration. Here a particular pH value must be kept constant or multiple dosing has to be carried out under exactly defined conditions. This means that a certain volume of a solution must be added within a fixed time. In addition to controlled dosing, the parameters pH (or potential) and temperature are continuously recorded, thus providing complete documentation of the synthesis procedure.

Everything under control

If a monitored parameter should infringe the set limits, the user can decide whether dosing should be continued or interrupted and then continued manually or automatically, again observing the limits.

Controller

As an innovation your Titrando can perform control tasks. External devices can be controlled by means of freely programmable TTL signals or communication via RS 232. Thus, you can operate external heating and cooling devices, pumps or similar equipment by remote control.



Example of a neutralization process:

1. DOS Addition of 150 mL reagent in 10 min with temperature monitoring
2. Pause 5 min under stirring
3. STAT Adjust pH = 7.5 with temperature monitoring
4. SET Post reaction, for example, during 10 min; endpoint pH = 7.5

tiamo – titration and more!

tiamo is a control and database software for titrators, dosing devices and sample changers that allows complete laboratory automation. This is why the name ***tiamo*** stands for «titration and more» – ***tiamo*** can do much more than just titrate.

Easy to use

The modern user interface makes it easy for users to familiarize themselves with ***tiamo***. All commands and controls are to be found exactly where you expect them. The layout manager can be used to configure the screen view individually for each user. Users see only those windows or buttons that are required for their work. This shortens the familiarization period for routine users to a minimum.

Parallel titration

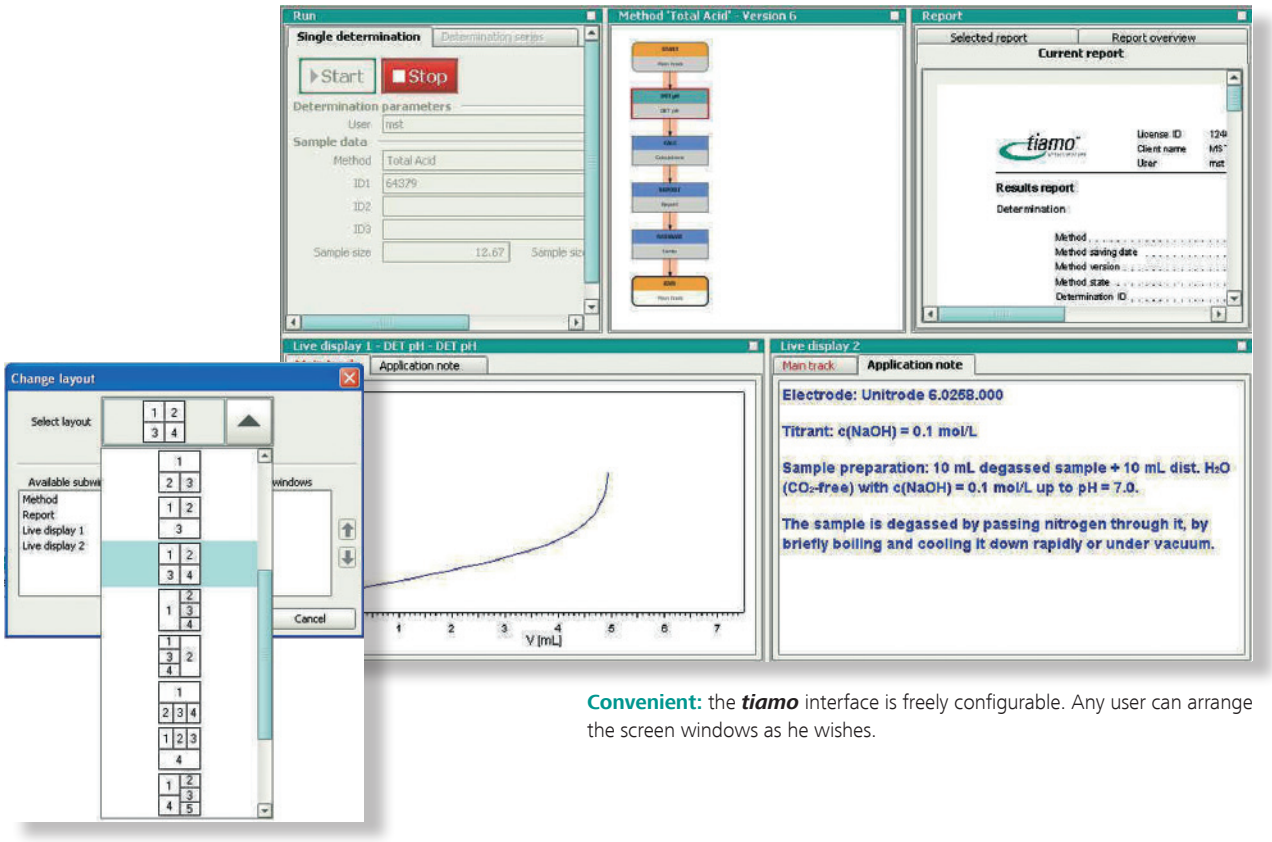
Both measuring inputs and all the Dosinos connected to a Titrando can be controlled independently of each other. In combination with ***tiamo*** this allows the parallel titration of two identical or two different samples with a single titrator.

Straightforward data management

The ***tiamo*** database provides all the important tools for the management, searching and grouping of results. Quick filters allow you to search through thousands of results in a matter of seconds and show the searched-for information in a clear way. Chart plots provide a rapid overview of the chronological sequence of results. You can use a multitude of possibilities for re-calculation and re-evaluation.

LIMS & Co.

The acceptance of PC-controlled analytical systems depends largely on their simple and affordable integration into existing laboratory information systems, central databases and long-term archiving systems. Data generated in ***tiamo*** is exported in CSV or XML format. This enables the simple connection to virtually all LIMS products currently available on the market. Analysis reports can be generated with the new report generator, which allows the free definition of report templates. One or more determinations can be shown at any time with a freely selectable layout in pdf format or, if you prefer, as a paper printout.



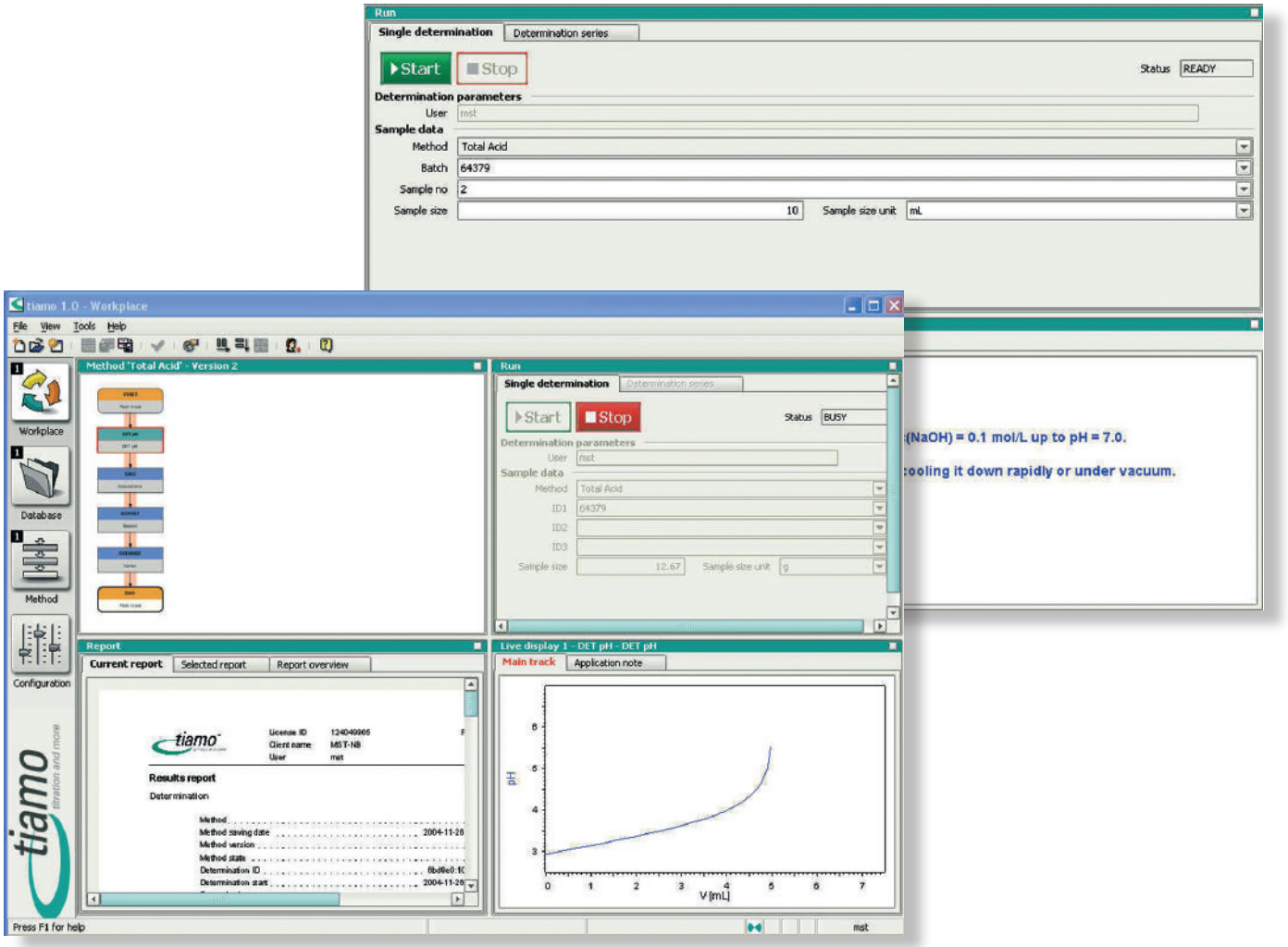
Convenient: the ***tiamo*** interface is freely configurable. Any user can arrange the screen windows as he wishes.

tiamo increases efficiency

The graphical method editor gets more out of your titration system. Methods can be drawn up easily and quickly by using the numerous templates. You can program and link actions that are to be carried simultaneously. ***tiamo*** is flexible and adapts itself to your analytical sequences – not vice versa.

All requirements met

tiamo also sets new standards with respect to compliance with GMP, GLP and FDA requirements. ***tiamo*** has been consistently oriented to meet FDA Regulation 21 CFR Part 11 and its customer-specific interpretations.



A clear view: only the parameters that are needed appear in the window, so the layout is always clear and tidy.

Technical specifications

	902 Titrando
Dosing elements	Space for two 800 Dosinos with 807 Dosing Unit
Attachment of additional dosing elements	Up to 9 x 805 Dosimat with 806 Exchange Unit Up to 12 x 800 Dosino with 807 Dosing Unit
Intelligent Exchange Unit/Dosing Unit with integral Data Chip	yes
Dosing steps per cylinder volume (resolution)	902 Titrando with 800 Dosino: 10'000
Operation, dialog	Touch Control or PC Control / ***tiamo***
Stirrers, titration stand	4 x 801 Magnetic Stirrer or 4 x 802 Rod Stirrer with 804 Titration Stand
Attachment of Dosimats, Dosinos, stirrers	4 MSB connectors (Metrohm Serial Bus, Daisy Chain)
Sample Changer attachment	1 sample changer via USB
Attachment of balances, printer, PC, PC keyboard, barcode reader and/or Lab Link	Via 2 USB Slave Ports, USB RS Converter (optional)
Attachment of additional measuring modules (867 pH Module or 856 Conductivity Module)	yes
USB stick for methods, results, Keycard (user identification), backup	yes (Touch Control)
Temperature sensor	Pt 1000 or NTC
Differential amplifier	Option
Real-time curve display on Touch Control (90 mm x 120 mm, high-res color screen or PC screen	yes
SET Titration to a preset endpoint with automatic conditioning	yes
STAT Titration to a preset endpoint and maintaining the corresponding measured value	yes
MEAS Measuring mode for pH, U/mV, T/°C	Resolution: 0.001 pH, 0.1 mV, 0.1 °C; Measuring interval: 100 ms
CAL Calibration with automatic buffer recognition	yes
Second, galvanically separated measuring interface for pH, U/mV, T/°C	Option
I_{pol} and U_{pol} – integrated programmable Polarizer	yes
Sequences can be freely programmed by the user	yes
Method and sample data memory, result memory, data base	yes
Dialog languages: English, German, Chinese; additional languages can easily be added	yes
Comprehensive GLP/GMP functions; meets requirements of FDA 21 CFR Part 11	yes
Intelligent electrodes «iTrodes»	yes
GLP-compliant electrode test	yes
Check for result limits	yes
Access control by means of login with password protection; Electronic Signature	yes
Liquid handling with expanded dosing instructions for the 800 Dosino	yes

Ordering information

902 Titrando

2.902.0010 902 Titrando with one combined analog/digital measuring input

Options

2.900.0010 900 Touch Control
6.6056.252 ***tiamo*** Full
2.800.0010 800 Dosino
2.801.0040 801 Magnetic Stirrer
2.802.0040 802 Rod Stirrer for 804
2.804.0040 804 Ti Stand for 802 Rod Stirrer
2.805.0010 805 Dosimat
2.854.0010 854 iConnect for connection of intelligent electrodes «iTrodes»
2.141.0100 USB thermal printer Neo's (for 900 Touch Control)

6.2148.010 Remote Box MSB
6.2148.050 USB/RS-232 Converter
6.2061.010 Reagent Organizer, holds two 1 L bottles; for dosing with Dosinos and Dosing Units

Intelligent 807 Dosing Units equipped with Data Chip; with glass cylinder for 800 Dosino, including accessories and two buret tips, one of them with micro outlet valve

6.3032.120 Buret volume 2 mL
6.3032.150 Buret volume 5 mL
6.3032.210 Buret volume 10 mL
6.3032.220 Buret volume 20 mL
6.3032.250 Buret volume 50 mL

Intelligent 806 Exchange Units equipped with Data Chip for 805 Dosimat; with glass cylinder and flat PCTFE/PTFE stopcock

6.3026.110 1 mL Exchange Unit with one tip each for titration and dosing
6.3026.150 5 mL Exchange Unit with one tip each for titration and dosing
6.3026.210 10 mL Exchange Unit with one tip each for titration and dosing
6.3026.220 20 mL Exchange Unit with one tip each for titration and dosing
6.3026.250 50 mL Exchange Unit with one tip each for titration and dosing

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