

841 Titrando

The Karl Fischer Titrando for  
the modern titration laboratory

*titrando*<sup>®</sup>

Titrando-System – the Magic Touch



Karl Fischer titrators

*titrando*<sup>®</sup>



- Touch Control with large color display

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- PC Control for operation via PC

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- Intuitive operation

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- Intelligent dosing elements

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- Karl Fischer titration and SET titration

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- Client-Server database thanks to **tiamo**

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- Parallel titration with **tiamo**

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- Sample Processor control

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- Lab Link for Intranet and Internet

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- Online help

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- Automatic reagent exchange with the unique Dosino

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- Fulfills GMP/GLP and FDA regulations such as 21 CFR Part 11

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- USB interfaces for sample changer, printer, PC keyboard, barcode reader...

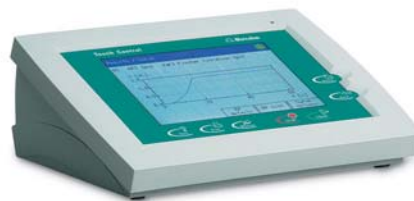
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# One system – two versions

The Titrando System offers two possibilities of operation. The resulting two basic variants are summarized below.

Instrument <b>841 Titrando</b>	Operation <b>840 Touch Control</b>	Reagent dosing <b>Dosino + Dosing Unit</b>
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Space-saving setup thanks to the operation via the Touch Control and reagent dosing using Dosino and Dosing Unit. A second dosing device does not require any additional space.



Instrument <b>841 Titrando</b>	Operation <b>PC Control</b>	Reagent dosing <b>Dosino + Dosing Unit</b>
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Operation via the PC, whose capabilities can be used directly. Also here the second dosing device does not require any additional space.





### **Touch Control screen = user comfort**

The Touch Control is a decidedly ergonomic and modern operating element. You can hold it in your hand, put it on the laboratory bench or use a holder (option) to attach it to a rod or hook it onto the wall. These last two possibilities save space and also protect the Touch Control from chemicals.

Up to three Titrandos can be controlled by a single Touch Control.

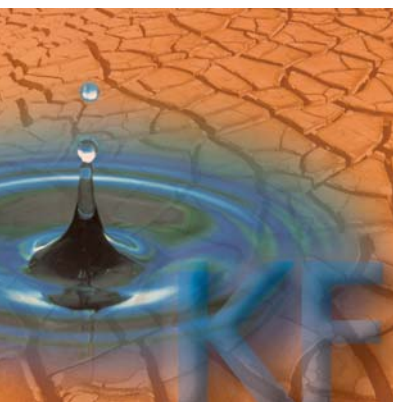
### **Titrandos and PC – a harmonic duo**

The Titrandos is of course PC-compatible. The Titrandos System concludes a development that started with the one-line instrument dialog. No matter whether you operate the Titrandos with the Touch Control and your fingers or via a PC and a mouse – both appearance and operation are practically identical. Methods and determinations are 100% compatible. Whether you store them in the Titrandos itself or in a PC, full exchangeability is guaranteed.

One PC equipped with the PC Control software can control up to three Titrandos.



# Water determination with the Titrando



## Karl Fischer titration

The Karl Fischer water determination is one of the most frequently applied laboratory methods. In contrast to other water determination methods it is specific as well as rapid and requires no expensive equipment. With an application range of 0.1% to 100% water the volumetric Karl Fischer titration is used in a wide variety of fields. No matter whether you determine the water content in food, cosmetics or pharmaceutical products, the 841 Titrando is always the right instrument.

The sophisticated control algorithm of the Titrando has been adapted to the characteristics of the Karl Fischer reaction and guarantees highly precise results. You can choose between a polarized alternating current ( $I_{pol}$ ) or a defined voltage ( $U_{pol}$ ) to be applied to the electrode. Both working modes yield fast and precise results.

Different reagents require different parameters. The 841 Titrando lets you select the appropriate method for each type of reagent.

Combined with the easy and intuitive user guidance this is the optimal instrument for routine operation as well as for demanding applications in research labs. With the 841 Titrando you acquire a titration system that meets all imaginable requirements and demands no compromises. Just one example: The KF icons show you at a glance whether the instrument is still busy conditioning or whether you can start the water determination.



The iodine drop indicates the KF reagent addition during conditioning.



Conditioning is finished and the sample can be added.

The electrode test and the newly created parameter «safety stop» prevent cell run-over during conditioning. If, for example, the electrode is not connected correctly or the titration cell is very humid, conditioning is stopped after a given time or a given volume of KF reagent added. This new feature increases work safety in your laboratory.



KF titration with 841 Titrando und 803 KF Titration Stand. The «Reagent Organizer» accommodates the solvent and waste bottles.

### The new 803 KF Titration Stand

Use the 803 KF Titration Stand for stirring and manually exchanging the spent titration vessel contents. With the integrated membrane pump, solvent can be aspirated or added without the cell having to be opened. This translates into vastly reduced conditioning times.

### Automatic reagent change – so very easy!

The exchange of the spent KF Reagent in the titration cell can be performed manually with the 803 KF Titration Stand. The automatic procedure is even more convenient: You fix the time and the instrument carries out the automatic reagent exchange with the Dosino. In both cases, contact with harmful reagents is avoided.



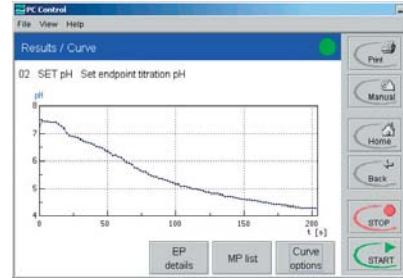
# Karl Fischer alone is not enough!

## The SET mode

The 841 Titrando also disposes of the SET mode, which means that potentiometric titrations to a preset endpoint (pH value or potential) can be performed. Typical applications of the SET mode are the determinations of p and m values in water analysis.

## pH meter included!

Besides the measuring input for polarized electrodes, the Titrando also has two electrode inputs for pH and reference electrodes. The resolution of the measuring inputs is 0.001 pH and thus identical to that of our precision pH meters. Ready-for-use methods for pH measurement as well as for electrode calibration are stored in the instrument. In addition the electrode characteristics and the «calibration history» of each sensor are memorized. Naturally, as with any pH meter, you can also measure the potential and temperature.



Step	Method	Description
01	REQUEST	Data request
02	SET pH	Set endpoint titration pH
03	CALC	Calculation
04	REPORT	Report
05		

Parameter	Value
Determination	p and m value-20030506-111811
Determ. time	2003-05-08 11:19:11+02:00
p value	0.00 mmol/L
m value	5.78 mmol/L
02 SET pH	Set endpoint titration pH
EP1	pH 7.421, 0.0000 mL
EP2	pH 4.282, 5.8040 mL

Titrant	Cyl.	Type	Dos. device
EDTA	10 mL	IJU	
H2SO4	20 mL	IJU	
HCl	50 mL	IJU	D1/Titrando 1
KF	20 mL	IJU	D1/Titrando 1





# Uniquely intelligent – simple to use

## Call up the method – press start

Method handling is a central feature of the Titrando's operator-friendliness. Standard user methods enable familiarization with the system and allow the Titrando to be used immediately. By using our methods you can profit from our many years of experience in the titration field. All titration methods developed on Metrohm Titrinos can be converted into Titrando methods automatically using a PC. As storage media for your methods, sample data and results there are the Titrando itself, a memory card\* or a PC with its numerous possibilities. This allows complete storage security to be achieved, with the prevention of method and data loss, plus an increase in operational security.

## Intelligence creates transparency

Operating the Titrando System is simple and intuitive. The operator guidance system can be regarded as exemplary. In addition, the following tools make life easier for the Titrando user:

- The «Quick Access» function (direct parameters) allows direct access to the parameters required for the given application. These parameters can come from a wide range of different areas of the instrument program. This means that it is no longer necessary for you to click your way through different operating levels! «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 requirements. Method templates and calculation formula templates are available for developing your own methods. Methods can be stored under meaningful method 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, i.e. it can be custom-made to meet the requirements of the particular user. This means that users can load their «profiles» from the 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 what is going on in clear text. Not only this; it also suggests suitable measures for remedying any faults.

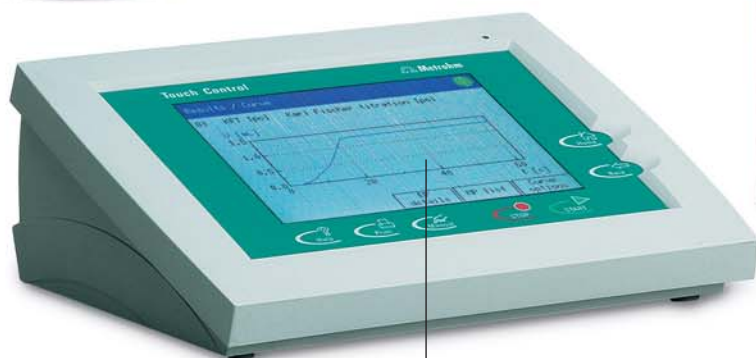
\* Commercial CompactFlash Card; non-volatile, compact data memory that does not need any battery.

# The Titrando System at a glance

Thanks to its modular concept the Titrando System can be optimally adapted to any application. It meets the requirements of FDA Regulation 21 CFR Part 11. Profit from its intelligence and multiple communication options (USB, RS 232C, Remote)!

Transparent operation – thanks to specially adapted dialogs, the Titrando accelerates method development and simplifies routine operation.

*titrando*<sup>®</sup>



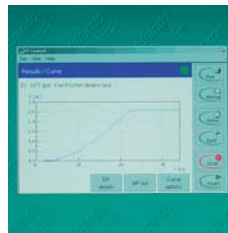
The large color screen of the Touch Control informs you about the instrument condition and offers uniquely comfortable operator guidance. For operation via a PC the appearance is exactly the same.



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



Numerous worked-out methods and titration examples make familiarization easier. Method templates and calculation formula templates are available for developing your own methods.



Extended titration and evaluation parameters open up new applications.



Thanks to the sophisticated Liquid Handling, automatic reagent exchange is now also possible in volumetric KF titration.



The 841 Titrando works with Dosing Units, which are ideal for handling KF reagents.



Lab Link provides access to the Intranet and Internet.



When combining **tiamo** and Titrando the user profits from a Client-Server database. Parallel titration – a Titrando can work with two titration cells at the same time (requires **tiamo**).



The Titrando System can be fully automated either with the new USB Sample Processors or the 774 Oven Sample Processor.

# Reagent dosing à la carte

## The space-saving Dosino

Titration means dosing intelligently. With the 841 Titrande you dose with Dosinos and Dosing Units that are attached directly onto 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 the latest 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 immediately and the valve position is always shown. Rinsing and preparation of the Dosing Unit can be carried out automatically; manual dismantling and cleaning are not necessary.

## The Dosino – the optimal KF dosing system

Thanks to the «Empty» command the Dosino can be emptied completely; this avoids the cumbersome opening and cleaning of the Dosing Unit.

Once the reagent is used up, the remaining content of the cylinder can be transferred directly to the bottle or the titration cell. The empty reagent bottle is then replaced, the Titrande executes the «Prep» routine and the titer determination of the new reagent can be started. In contrast to the Exchange Unit, multiple rinsing before titer determination is not necessary, which saves time and reagents.

When not being used, KF reagents tend to produce precipitates within the stopcock and tubes, requiring time-consuming cleaning operations. The «Empty» command does away with this problem.



# The Data Chip makes the difference

## Brainy dosing elements with certification

The Dosing Units set new standards with regard to reliability. Increased reliability not only saves you money, but also means few problems. Intelligence «en miniature» in the form of an inconspicuous Data Chip makes this possible. This chip is present in every new Dosing Unit. The Titrande 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 Titrande compares the data it has obtained with the selected method and carries out a plausibility test. If the result is negative then a clear error message appears.

The 800 Dosino has a simple but cleverly devised display consisting of two LEDs that keep you up-to-date about the condition of the dosing system. On the Dosing Unit both the cylinder volume and the valve position are clearly visible.

In addition, the newly developed Dosing Units offer the following advantages:

- Every Dosing Unit is provided with serial and cylinder numbers and is supplied with a certificate of its own.
- The Titrande checks the preset intervals for the titer determination of the titrant. This ensures that work is always carried out with the exact titer.



Via the four contact pins on the 807 Dosing Unit's underside (right) the Titrande receives the information stored on the Data Chip.

# The Titrande in the modern laboratory

## **tiamo = titration and more!**

Instead of the PC Control Software you also have at your disposal the new titration software **tiamo**. The name stands for «titration and more» and illustrates the program's numerous abilities. In addition to the standard functions required for controlling a Titrande, **tiamo** offers functionalities that up to now you could only dream about:

- Method editor for the unrestricted creation of titration and automation sequences – even complex determinations are easy to master. As an example, the next sample in line can be prepared while the current determination is still underway.
- Client-Server database for the sharing of results and methods within a titration network. The user also has at his disposal comprehensive evaluation, recalculation and statistics functions.
- Detailed user administration with defined access rights and individual screen organization. The new Layout Manager allows to perfectly adapt the configuration for each user. All this makes the operation of **tiamo** as easy as 1, 2, 3!

## **Data management is knowledge management**

Data must always be available: either for direct information, for transfer to a data system, for further processing or for an audit. The data that your Titrande System provides you with can be printed out and stored in a conventional manner. However, all advanced data management functions are available, for example storage on a PCMCIA card<sup>1</sup> that is simply inserted in the Touch Control, in the PCMCIA port of the PC or an appropriate card reader.

When you work with PC Control or **tiamo**, you can use all the storage options offered by the PC world, for example hard drives, diskettes, CD ROMs, Intranet...

On request the Titrande can produce a machine-readable PC/LIMS report. One thing is clear: As for data storage and transfer, the Titrande is a state-of-the-art instrument.

## **Lab Link**

If you want to connect your Titrande System directly to a superior data system, there is nothing in the way: Lab Link opens up internal networks (Intranet, LIMS<sup>2</sup>, LAN<sup>3</sup>) to the Titrande and makes it Internet-compatible, with all that this implies. For long-term storage you can use, for example, tools such as NuGenesis Scientific Data Management System, eRecordManager and CyberLab, and this without a PC being connected to the Titrande. The downloading of methods from company-specific websites is another application of Lab Link.

## **Never has integration into your LIMS structure been so easy!**



<sup>1</sup> A CompactFlash Card with adapter is included in the standard accessories of the Titrande. PCMCIA = Personal Computer Memory Card International Association (International Organization for PC memory cards)

<sup>2</sup> LIMS = Laboratory Information Management System

<sup>3</sup> LAN = Local Area Network

Is modern and looks modern: the Titrande System.

# Quality and compatibility



21 CFR Part 11 as presented on the FDA website (www.fda.gov).

## Compatibility and traceability

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

- Each time that it is switched on the Titrand System carries out a self-diagnosis.
- If it has been programmed accordingly then the instrument will remind you about any validation or service work that is due.
- You can enter limits for results; their observation 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 the results.

- All changes to the methods are documented; traceability is guaranteed.
- The Titrand allows 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 in the stand-alone system using Touch Control as well as in the version controlled via PC. This also applies to the other points contained in this regulation, namely the protection of electronic records against accidental or intentional alteration and complete traceability. The Titrand with Touch Control is the only stand-alone titration system with Audit Trail. For long-term archiving a machine-readable PC/LIMS report is available.

## Quality management at Metrohm

Quality has always been extremely important for Metrohm. On 5<sup>th</sup> November 1993 our company achieved the ISO 9001 certificate of quality. The Metrohm quality management system is continually being perfected and checked by both internal and external audits.

The Titrand System is modern. This also applies to the object-oriented development system used in its creation. The Touch Control as a color display and operational element is unique, as are the many other innovations of the Titrand System.



# Integrated automation

## Perfect modularity

The possibilities for upgrading the Titrando System are nothing short of amazing. First the bare figures: The basic unit consists of a Titrando with one measuring interface. This basic unit can be extended 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 can solve your particular application problem in an optimal way. At the same time you have the certainty that your Titrando System will master all your future applications as it is fully upgradable. As a result you can view the future with confidence.

## Automation pays dividends!

Increasing sample numbers, time-consuming sample preparation steps and unattended overnight operation are good reasons for using sample changers. The 841 Titrando has the necessary intelligence to control sample changers and offers – together with the new instruments 814 USB Sample Processor and 815 Robotic USB Sample Processor XL – a high degree of automation at low investment costs.

It's amazing: You simply connect the sample changer to the Titrando's USB port and the world of automation opens up to you.

Besides the new USB Processors it is also possible to use the 841 Titrando with the 774 Oven Sample Processor – thanks to **tiamo!** Our sample changer brochure supplies detailed information on the automation possibilities offered by the new sample changer generation.





# Overview of 841 Titrando



Dosing elements	Space for two 800 Dosinos with 807 Dosing Unit
Attachment of additional dosing elements	12 x 800 Dosino with 807 Dosing Unit
Intelligent Dosing Unit with integral Data Chip	•
Dosing steps per cylinder volume (resolution)	Dosino 800: 10'000
Operation, dialog	Touch Control or PC Control (three Titrandos can be attached to each)
Stirrers, titration stand	4 x 801 Magnetic Stirrer or 4 x 802 Rod Stirrer with 804 Titration Stand or 803 KF 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, RS 232 Box USB (option)
PCMCIA memory-card port for methods, results, Keycard (user identification), backup	•
8 MB CompactFlash Card with a large number of user methods	•
Temperature sensor	Pt 1000 or NTC
Real-time curve display on Touch Control (90 mm x 120 mm color graphics LCD) or PC screen	•
SET Titration to preset endpoints with automatic conditioning	•
KF Volumetric Karl Fischer titration with automatic conditioning	•
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	•
Second, galvanically separated measuring interface for pH, U/mV, T/°C	Option
$I_{pol}$ and $U_{pol}$ – integrated programmable Polarizer	•
Sequences can be freely programmed by the user	•
Method and sample data memory, result memory, database	•
Dialog languages: English and German; additional languages can easily be added	•
Comprehensive GLP/GMP functions; meets requirements of FDA 21 CFR Part 11	•
Intelligent dosing devices (world novelty)	•
Check for result limits	•
Access control by means of login with password protection, «Electronic Signature»	•
Liquid handling with expanded dosing instructions for the 800 Dosino	•
Automatic reagent exchange	•



## Ordering information, options



**2.841.0010** Titrande 841 with one measuring interface; with comprehensive accessories including titration vessel and indicator electrode

**2.840.0100** 840 Touch Control for 841 Titrande  
6.6050.200 PC Control software for 841 Titrande, including Hardware Dongle

### Options

**2.801.0040** 801 Magnetic Stirrer  
**2.803.0010** 803 KF Titration Stand  
6.2051.030 Holder for 840 Touch Control  
6.2834.030 Foils for 840 Touch Control, 3 pieces  
6.2133.010 Batteries 1.5 V LR6 for Touch Control, 2 pieces  
6.2247.000 Adapter CompactFlash Card – PCMCIA port (included in the standard accessories)  
6.2247.010 CompactFlash Card 8 MB (empty; the standard accessories include a card with user methods)  
6.2148.010 Remote Box MSB  
6.2148.020 RS 232-Box USB  
6.2151.000 Cable USB A plug – Mini-DIN plug, 8 pins  
6.2151.010 Extension cable Mini-DIN socket – Mini-DIN plug, length 2 m  
6.2151.020 Cable USB A plug – USB B plug, length 1.8 m  
6.2151.030 Cable USB A plug – USB B plug, length 30 cm

**2.825.0010** 825 Lab Link

**2.800.0010** 800 Dosino for 841 Titrande  
6.2061.010 Reagent Organizer, holds two additional 1 L bottles; for dosing with Dosinos and Dosing Units

titra

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

*ando*<sup>®</sup>



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