Metrohm
Ion analysis

CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
Internet www.metrohm.com

Titrando

Installation Instructions

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Teachware
Metrohm AG
Oberdorfstrasse 68
CH-9101 Herisau
teachware@metrohm.com

Although all the information given in these Instructions has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please inform the author at the address given above.

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List of illustrations

1 Introduction

These installation instructions provide you with a comprehensive overview of the installation and specifications of the **Titrando system**. The Titrando is the centerpiece of the modular Titrando system. Operation is carried out either via a **Touch Control** with touch-sensitive screen ("stand-alone" titrator) or from a computer via the USB connection and using the PC software **PC Control** or ***tiamo***.

A Titrando system can integrate several, different devices. With PC Control/Touch Control, up to three control devices (Titrandos, Dosing Interfaces, USB Sample Processors, etc.) can be controlled via USB connection. The *tiamo* software allows to expand the system with practically any number of control devices. The control devices have three to four MSB connections (MSB = Metrohm Serial Bus), to which peripheral devices can be connected. These are mainly dosing drives (700/800 Dosinos and 685/805 Dosimats), stirrers and titration stands, etc.

Figure 1 shows you the flexibility of the Titrando system. On the left a Titrando is shown with external dosing devices operated by the Touch Control. To the right of it you can see an automation system consisting of a USB Sample Processor, a Titrando with internal dosing drive and a Dosimat operated by the PC Control software.

Fig. 1: The Titrando system

Additional information about the Titrando system can be found on the Internet under www.titrando.com.

Information about specific applications can be found in our **"Application Bulletins"** and **"Application Notes"**; these can be obtained free of charge from your local Metrohm agency or downloaded from the Internet under www.metrohm.com. Various **monographs** on the subjects of titration techniques and electrodes are also available.

1.1 Instrument description

The Titrandos differ mainly from the kind of dosing drive. They are equipped either with an internal dosing drive for an exchange unit (type 806 or previous) or for the use of external dosing devices (700 and 800 Dosinos with 807 dosing units).

Common features of the Titrando:

- A connection for Touch Control or for a computer with PC software **PC Control** or ***tiamo***.
- Four MSB connections (Metrohm Serial Bus) each controlling one dosing device (Dosimat with exchange unit or Dosino with dosing unit), a stirrer or titration stand and a remote box.
- One or two measuring interfaces. A measuring interface consists of a high-impedance measuring input for pH, redox or ISE sensors, an input for a separate reference electrode, a measuring input for temperature sensors (Pt1000 or NTC) and a measuring input for polarized electrodes.
- Two USB connections allow to connect, for example, a printer, keyboard, barcode reader or additional control devices (USB Sample Processor, Titrando, Dosing Interface, etc.).

1.2 Information about the Installation Instructions

Attention!
Please study these Installation Instructions carefully before you start to use the Titrando. The instructions contain information and warnings that must be observed by the user in order to guarantee the safe use of the instrument. Please keep these instructions near the instrument so that they are always to hand when required.

1.2.1 Organization

These Installation Instructions for the Titrandos provide you with a comprehensive overview of the installation, startup, troubleshooting and technical specifications of the instruments.

The Installation Instructions are arranged as follows:

Introduction
General description of the instrument, operating elements and safety information

Installation
Installation of the instrument, connection of the peripheral devices and accessories

Troubleshooting
Description of possible errors and how to remedy them

Appendix
Technical data, standard equipment, optional accessories, warranty and declaration of conformity

Index
In order to find the information you require about the Titrando you should either use the **Table of contents** or the **Index**.

1.2.2 Notation and pictograms

The following notation and pictograms are used in these Instructions:

9	**Control element, instrument element** see illustrations in *Section 1.3*
☞	**Instruction** Carry out the instructions step by step.
[Continue]	**Button** on the user interface
	**Danger** This symbol indicates a possible risk of death or injury to the user and possible damage to the instrument or its components by electricity.
	**Warning** This symbol indicates a possible risk of damage to the instrument or its components if the given information is not properly observed.
	**Attention** This symbol indicates important information that you should read before continuing.
	**Information** This symbol indicates additional information and tips that may be particularly useful.

1.3 Parts and controls

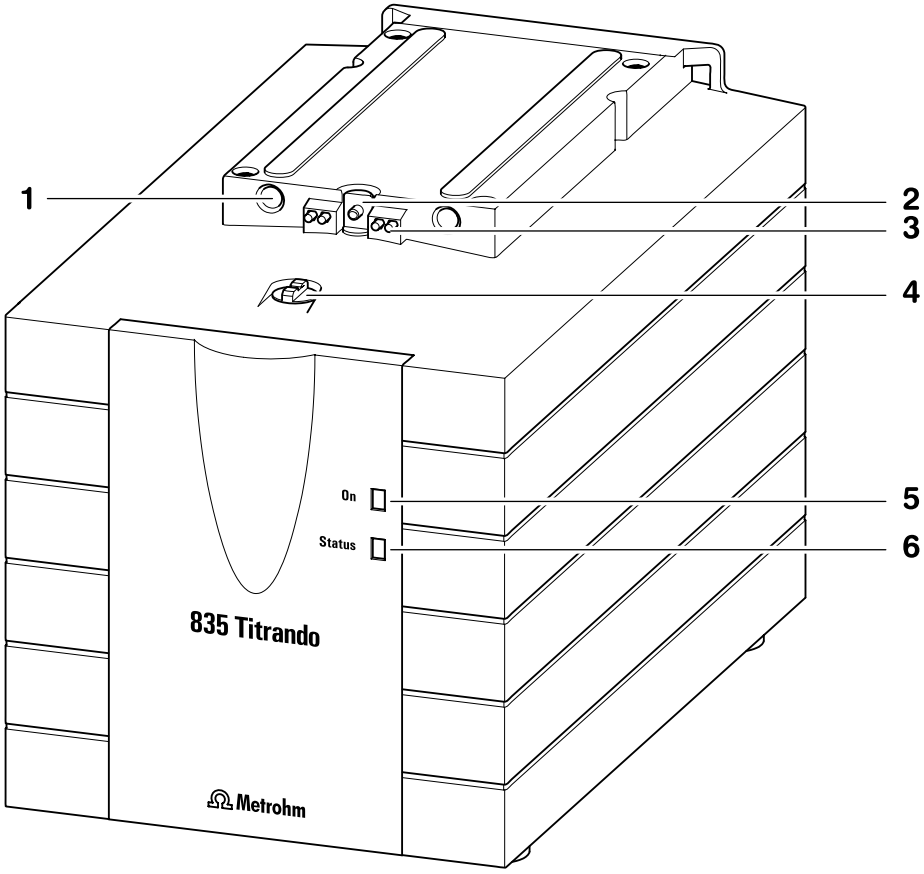


Fig. 2: Front view of a Titrando with internal dosing drive

1 Guide openings
for centering the exchange unit

2 Push rod
of the dosing drive

3 Contact pins
for the data chip

4 Coupling
for switching the flat cock

5 "On" LED
Lights up when the Titrando is connected to the mains supply and a controller (Touch Control or computer) is connected and switched on.

6 "Status" LED
Shows the current status of the internal dosing drive (see *Section 2.4.2*).

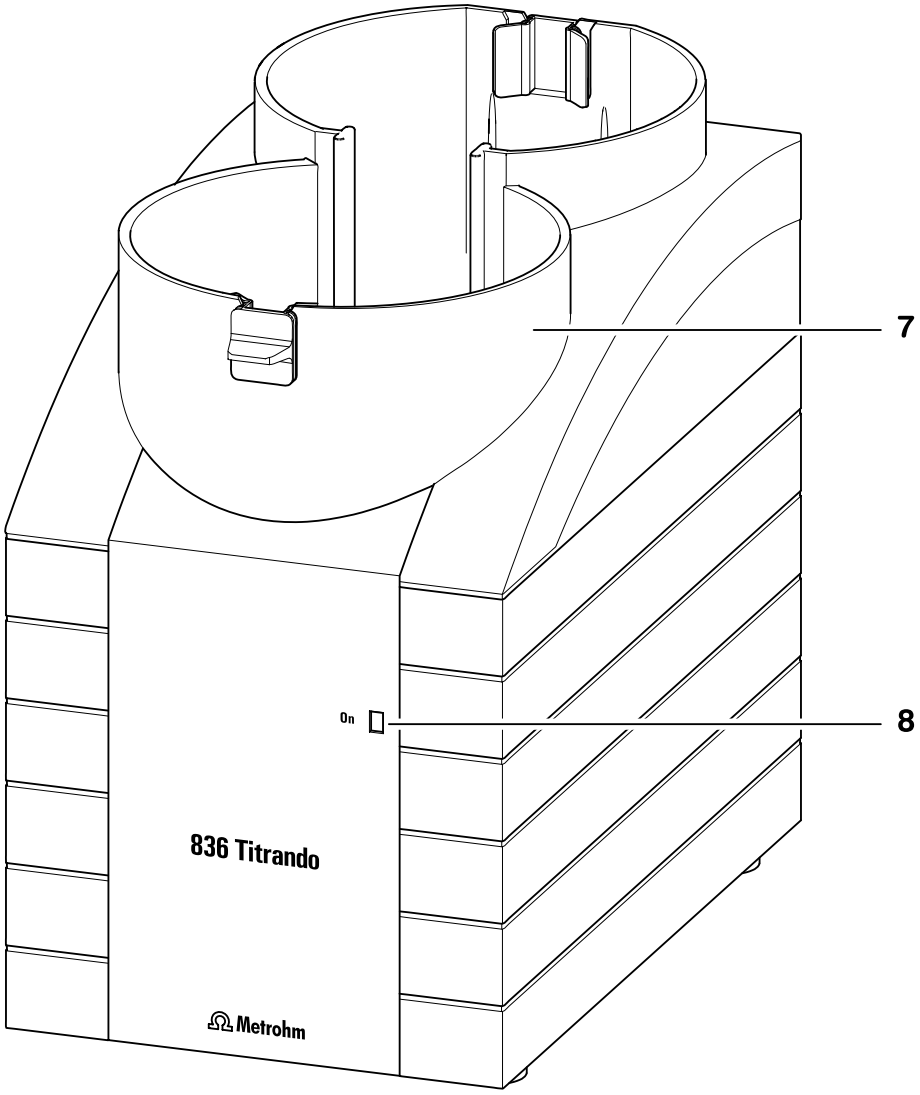


Fig. 3: Front view of a Titrando for the use of external dosing devices

7 Bottle holder
with holding clips, for two reagent bottles

8 "On" LED
Lights up when the Titrando is connected to the mains supply and a controller (Touch Control or computer) is connected and switched on.

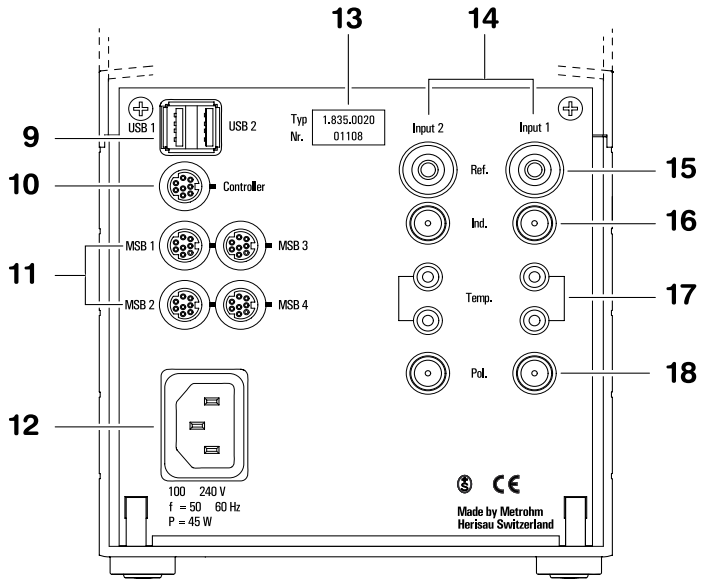


Fig. 4: Rear view of the Titrando

9 USB connections USB 1 and USB 2
USB ports (type A) for connection of printer, keyboard, barcode reader, additional Titrandos, USB Sample Processor, etc.

10 Controller connection
Connection for Touch Control or PC with installed PC software

11 MSB connections MSB 1 to MSB 4
Metrohm Serial Bus
Connection for external dosing device, stirrer or remote box

12 Mains connection socket
Mains connection

13 Instrument type and serial number

14 Measuring interface 1 (Input 1) and Measuring interface 2 (Input 2)
Models 2.8XX.0010: 1 measuring interface,
Models 2.8XX.0020: 2 measuring interfaces

15 Connection for reference electrode (Ref.)
e. g. Ag/AgCl reference electrode

16 High-impedance measuring input (Ind.)
Connection of pH, redox or ISE sensors with built-in or separate reference electrode

17 Connection for temperature sensors (Temp.)
Pt1000 or NTC

18 Measuring input for polarized electrodes (Pol.)
e. g. double Pt electrodes

1.4 Safety notes

Warning!
This instrument should only be used in accordance with the information given in these installation instructions.

1.4.1 Electrical safety

Please observe the following guidelines:

- Only qualified Metrohm technicians should carry out service work on electronic components.
- Do not open the Titrando housing. This could destroy the Titrando. Inside the housing there are no components that the user can service or exchange.

Electrical safety when handling the Titrando is guaranteed within the framework of the IEC 61010 Standard. The following point must be observed:

Protection against electrostatic charges

Warning!
Electronic components are sensitive to electrostatic charges and can be destroyed by a discharge. Always remove the mains cable from the power supply socket before setting up or breaking electrical connections on the rear panel of the instrument.

2 Installation

This section describes what you should pay attention to when unpacking and setting up the Titrando. It also informs you about how a complete titration system – from a simple system with stirrer and printer up to a complicated system with additional dosing devices, sample changer and balance – is assembled.

The following illustration provides an overview of the peripheral devices that can be connected to a Titrando:

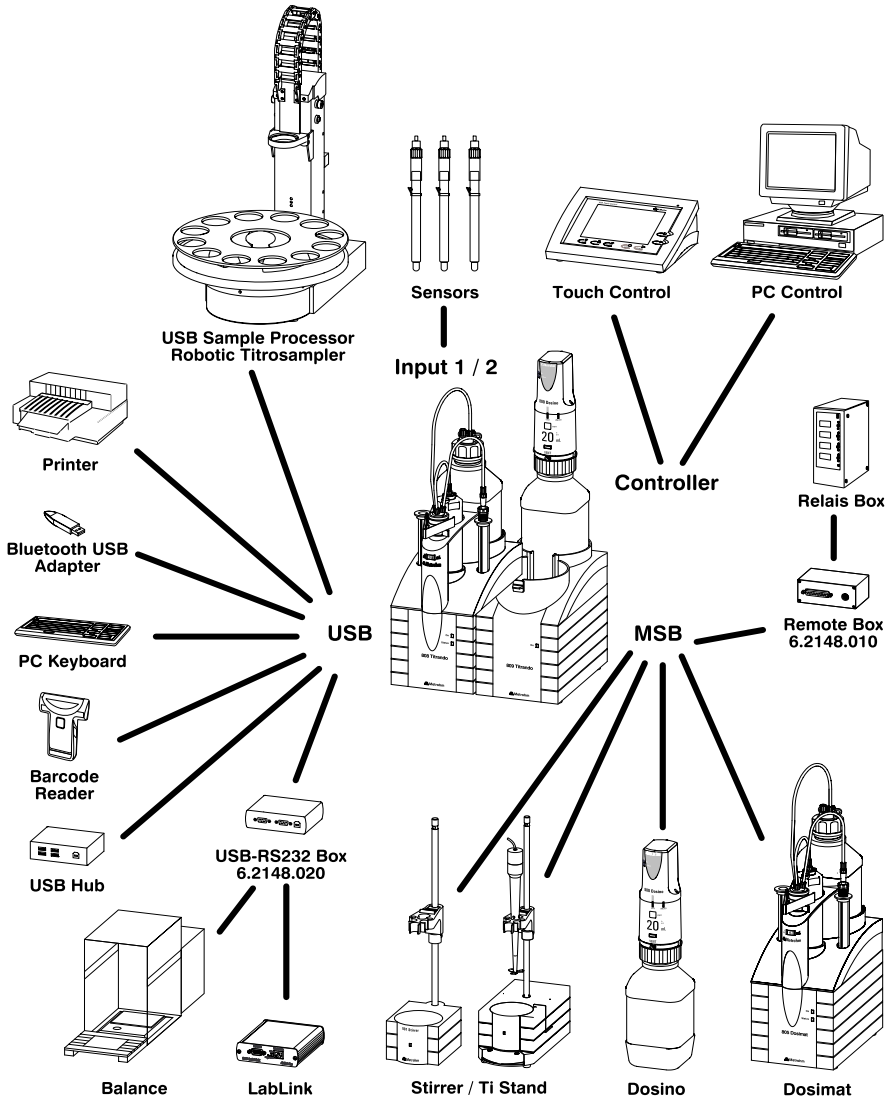
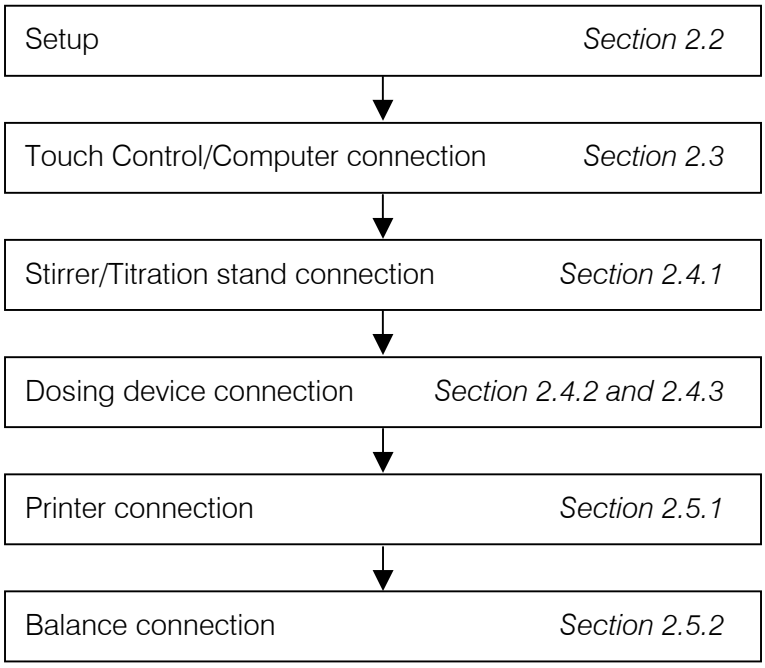


Fig. 5: Titrando – Peripheral devices

2.1 Overview

The following flow diagram provides an overview of the installation of a simple titration system with stirrer, external dosing device, printer and balance. More detailed information can be found in the given sections.



2.2 Instrument setup

2.2.1 Packaging

The Titrando and the separately packed accessories are delivered in special packaging that provides excellent protection. Please store this packaging in a safe place as no other packaging can guarantee the safe transport of the instrument.

2.2.2 Checks

Please check whether the delivery is complete and undamaged immediately on receipt (compare with delivery note and list of accessories given in *Section 4.2*). If transport damage is evident please refer to the information given in *Section 4.4.1*.

2.2.3 Location

The Titrando was developed for internal laboratory use; it should not be used in explosion-endangered locations.

Place the instrument on a suitable vibration-free laboratory bench, protected as much as possible from corrosive atmospheres and contact with chemicals.

Choose a location where the temperature is usually between +5 °C and +45 °C. The instrument should be protected against excessive variations in temperature and direct sunlight.

2.3 Controller connection

Two different methods of controlling the Titrando are available:

- The **Touch Control** with contact-sensitive screen forms a "stand-alone" titrator together with the Titrando.
- A computer can be used to control the Titrando by using the PC software **PC Control** or ***tiamo***.

Attention!
Make sure that the mains cable has been removed from the power supply socket before setting up or breaking connections between the instruments.

2.3.1 Touch Control connection

☞ Connect the plug of the Touch Control connection cable to the controller socket.

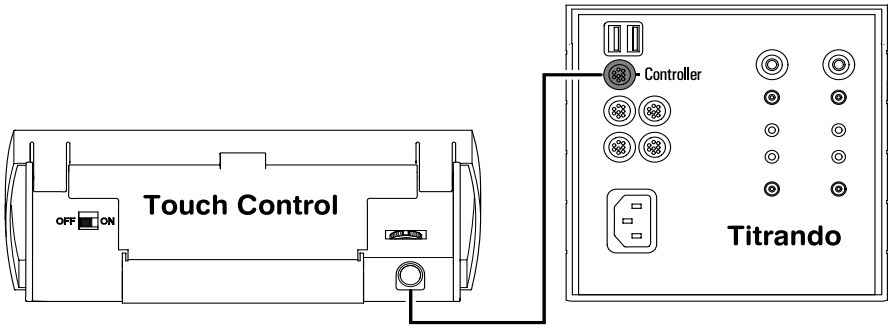


Fig. 6: Titrando – Touch Control

Note!
The plug is fitted with a "pull-out protection device" that prevents the cable from being pulled out accidentally. When you wish to insert or remove the plug you must first pull back the outer plug sleeves (marked with arrows).

Connect all peripheral devices (see *Section 2.4 and 2.5*) before you switch on the Touch Control.

Power for the Touch Control is provided by the Titrando.

☞ Connect the Titrando to the mains supply and switch on the Touch Control.

After switch-on automatic system tests are carried out on both the Titrando and the Touch Control. The "On" LED on the Titrando lights up when the system test is finished and the instrument is ready for use.

Attention!
The Touch Control has to be shut down properly with the ON/OFF switch at the back of the instrument before the power supply is interrupted. Otherwise data can be lost. Since the power for the Touch Control is supplied by the Titrando, never disconnect the Titrando from the mains connection (e. g. by switching it off via a mains distributor), before you have switched off the Touch Control.

If you do not want to place the Touch Control directly alongside the Titrando then you can extend the connection between the Titrando and Touch Control with the 6.2151.010 Cable. The connection length must not exceed 5 m.

2.3.2 Computer connection

☞ Install the **PC Control** or ***tiamo*** software on your computer. Quit the program if you have started it after the installation.

Connect all peripheral devices (see *Section 2.4 and 2.5*) before you connect the Titrando to the mains supply.

☞ Connect the Titrando to the mains supply. The LED "On" on the Titrando will not yet light up!

☞ Connect the Titrando to a USB connection (type A) on your computer with the 6.2151.000 cable (see the instruction manual for your computer).

Windows 2000: The Titrando will be recognized and the driver will be installed automatically. **Windows XP:** The Titrando will be recognized and the wizard for the installation of the driver will be started automatically. Select the option "Install the software automatically" and click on **[Next]**. End the wizard with **[Finish]**.

PC Control

☞ Connect the USB dongle ("authorization plug") supplied with the full version of the PC Control software to any USB socket (type A) of the computer or Titrando.

Windows 2000: The USB dongle will be recognized and the driver will be installed automatically. **Windows XP:** The USB dongle will be recognized and the wizard for the installation of the driver will be started automatically. Select the option "Install the software automatically" and click on **[Next]**. End the wizard with **[Finish]**.

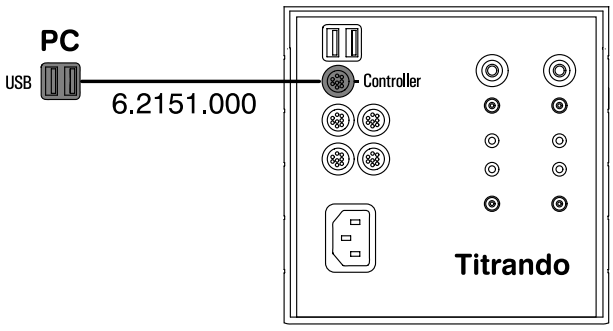


Fig. 7: Titrando – Computer

Note!
The plug for connecting to the Titrando is fitted with a "pull-out protection device" that prevents the cable from being pulled out accidentally. When you wish to insert or remove the plug you must first pull back the outer plug sleeves (marked with arrows).

You can extend the connection with a commercially available USB extension cable (type A/m – type A/f). The length of the connection should not exceed 5 m. If you require a longer connection then you must use a commercially available USB signal amplifier. Up to five USB signal am-

plifiers can be connected in series; this allows a maximum extension of 25 m.

☞ Start the PC Control or *tiamo* software.

The Titrando will be recognized automatically. When the PC Control or *tiamo* software is started a system test will be carried out automatically on the Titrando. The LED "On" on the Titrando lights up when the system test is finished and the instrument is ready for use.

2.4 Device connection at the MSB

The following devices can be connected via each of the four MSB connections (**M**etrohm **S**erial **B**us): one **stirrer** or **titration stand**, one Dosimat or Dosino **dosing device** and one **remote box**. The stirrers and remote boxes each have an MSB output so that the devices can be switched sequentially ("daisy chain"). The following illustration provides an overview of the devices that can be connected to an MSB.

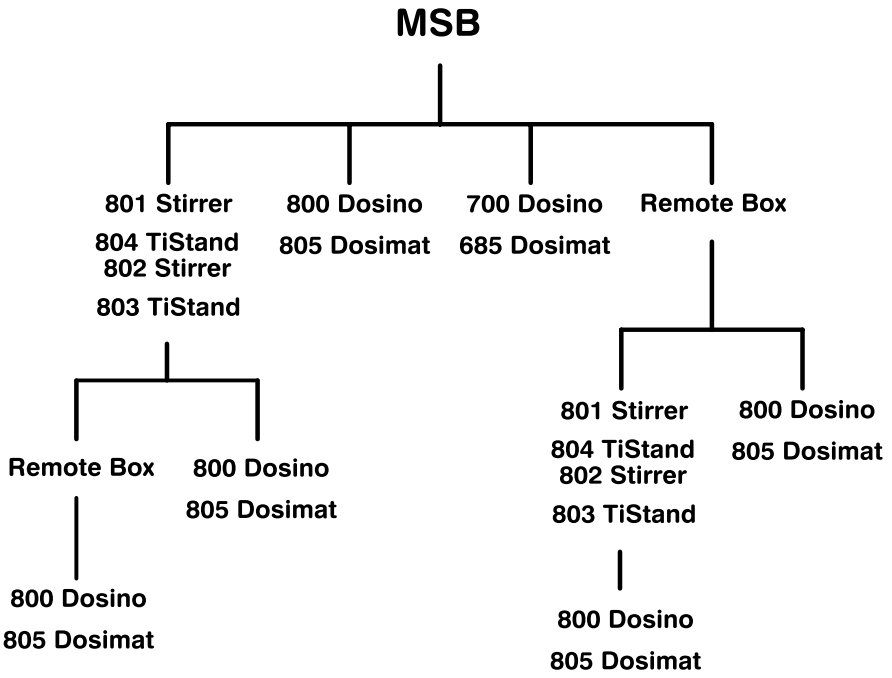


Fig. 8: Overview of MSB connections

The MSB 1 of the Titrando with internal dosing drive is occupied by the internal dosing drive. This means that only a stirrer and a remote box can be connected to MSB 1.

First connect all peripheral devices and then connect the Titrando to the mains supply. MSB connections can be extended with the 6.2151.010 cable. The maximum length of the connection is 15 m.

The Titrando automatically recognizes which device has been connected to which MSB connection. The Touch Control or the PC software (PC Control or *tiamo*) shows the connected devices in the device manager or the configuration dialog respectively. All devices connected to the MSB are operated by the Touch Control or PC Control/*tiamo*.

Attention!
If you are operating the Titrando with the Touch Control then make sure that the Touch Control is switched off while you are setting up or breaking connections between the instruments. If you are operating the Titrando with the PC software then pull out the plug from the power supply socket before setting up or breaking MSB connections.

2.4.1 Connecting stirrers and titration stands

You can use the **801 Magnetic Stirrer**, the **803 Titration Stand** (stirring from below) or the **804 Titration Stand** with **802 Rod Stirrer** (stirring from above).

☞ Connect the appropriate stirrer as follows:

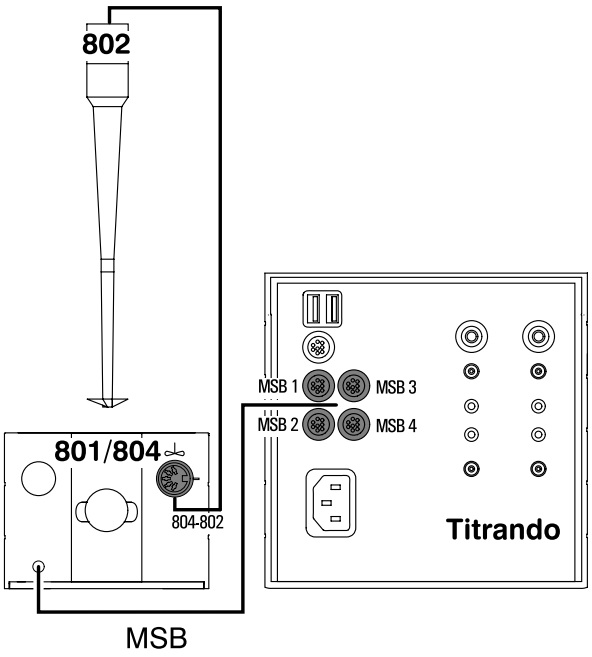


Fig. 9: Titrando – Stirrer

You can connect a maximum of one 801 Stirrer, one 804 Titration Stand with 802 Rod Stirrer or one 803 Titration Stand to each MSB socket. The 801 Stirrer as well as the 804 and 803 Titration Stands has a MSB connection to which an additional device, e. g. a dosing device, can be connected. We recommend that the stirrer is connected to MSB 1, as this corresponds to the default setting in the methods.

The **stand** and the stand support are included with the stirrer or titration stand. Fasten the stand support to the base of the Titrando with the four screws supplied. Decide whether you want to attach the stirrer to the right or left of the Titrando. The assembly of the support rod and the stirrer or titration stand is described in the Instructions for Use of the 801 Stirrer and the 804 Titration Stand or the 803 Titration Stand.

2.4.2 Attaching the exchange unit to the Titrando

Type 806 exchange units have a built-in data chip that allows the storage of data concerning the exchange unit and the reagent. Data is edited in the Touch Control or in the PC Control/*tiamo* software. The assembly of the exchange unit is described in the Instructions for Use of the exchange unit.

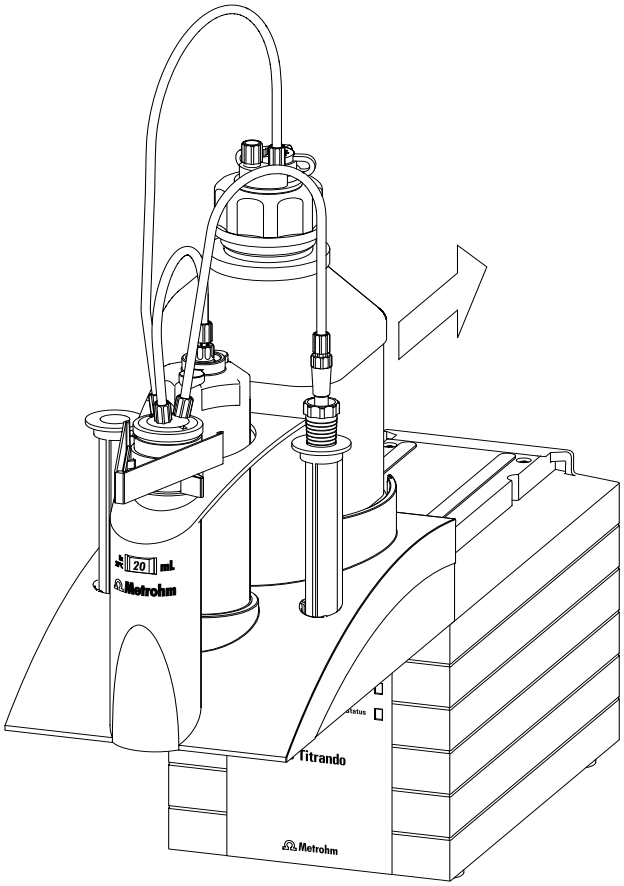


Fig. 10: Attaching the exchange unit to the Titrando

☞ Slide the exchange unit onto the Titrando so that it snaps into position and the "Status" LED slowly blinks.

If the exchange unit has been properly positioned then the exchange unit guide bolts will operate a microswitch and trigger the exchange unit initialization. The exchange unit will be recognized and the data is automatically read out from the data chip. The "Status" LED then lights up constantly.

The following table provides an overview of the operating statuses of the internal dosing device that can be indicated by the "Status" LED:

"Status" LED	*Dosing device operating status*
off	There is no exchange unit attached.
constant illumination	The Titrando is ready for dosing or titrating. The exchange unit has been attached correctly and recognized and is now in the change position, i. e. the exchange unit can be removed.
blinks slowly	The Titrando is currently dosing or filling or the exchange unit is not in the change position. An intelligent 806 Exchange unit has been attached and the data on the built-in data chip is currently being read out or written.
blinks rapidly	Dosing drive error (see *Section 3*, *Troubleshooting*)

2.4.3 Connecting an external dosing device

Three dosing devices of the type **805 or 685 Dosimat** or **800 or 700 Dosino** can be connected to Titrandos with an internal dosing drive and four of them to Titrandos without internal dosing drive. MSB 1 is occupied by the built-in dosing drive on the Titrando with internal dosing drive.

☞ Connect the dosing drive as shown in *Fig. 11* and *Fig. 12*.

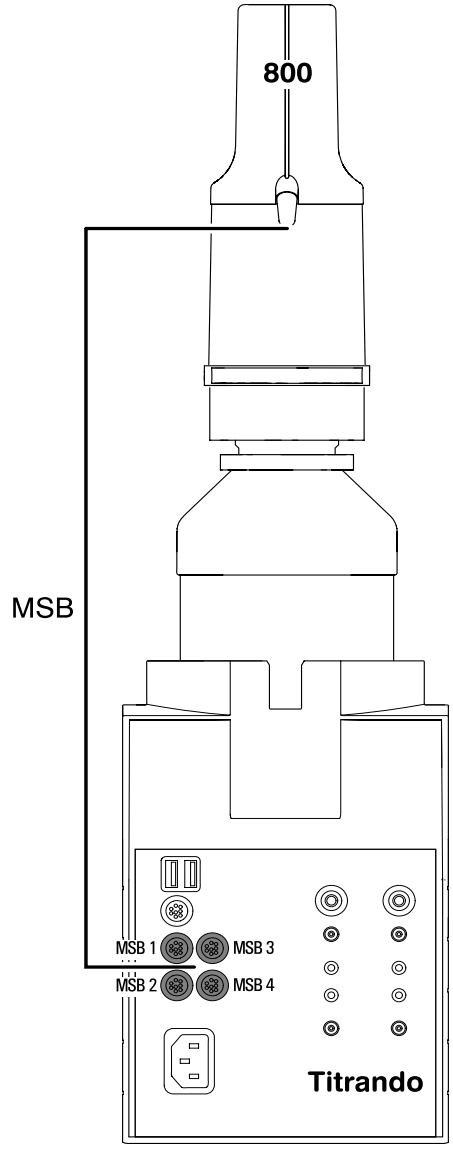


Fig. 11: Example for connecting a dosing device: Titrando – 800 Dosino

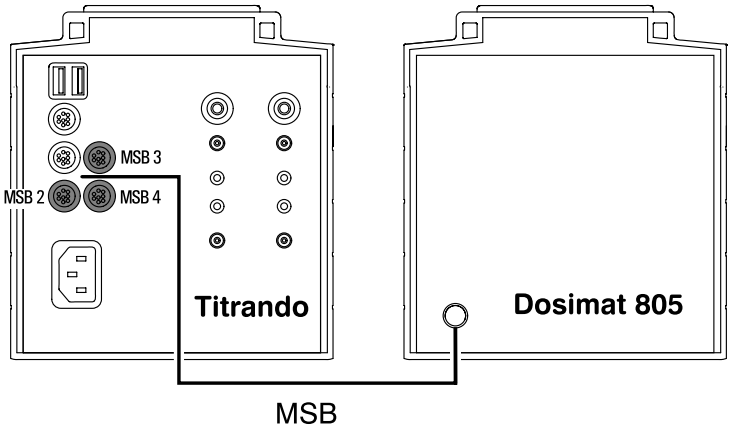


Fig. 12: Example for connecting a dosing device: Titrando – 805 Dosimat

The 685 Dosimat is connected to the Titrando with the 6.2134.030 cable. 685 Dosimat and 700 Dosino types must be connected directly to the MSB socket of the Titrando (see *Fig. 8: Overview of MSB* connections). If you want to connect a stirrer (see *Section 2.4.1*) and an external 800 Dosino (or 805 Dosimat) dosing device to a Titrando without internal dosing drive then we recommend that the stirrer is connected to MSB 1 and the dosing device to the MSB connection of the stirrer as this corresponds to the standard settings in the methods.

Type 806 Exchange units for the 805 Dosimat and type 807 Dosing units for the 800 Dosino have a built-in data chip that allows the storage of data about the exchange or dosing unit and the reagent. This data is automatically read out or updated by Touch Control or PC Control/*tiamo* when the exchange or dosing unit is attached to the dosing device. The data is edited in the Touch Control or in the PC Control/*tiamo* software.

2.4.4 Connecting a remote box

Instruments that are controlled by remote lines or can transmit signals to the Titrando via remote lines can be connected to the Titrando via the 6.2148.010 Remote box. The pin occupancy of the remote socket is described in the Instructions for Use for PC Control / Touch Control.

☞ Connect the remote box to an MSB connection on the Titrando in the following way:

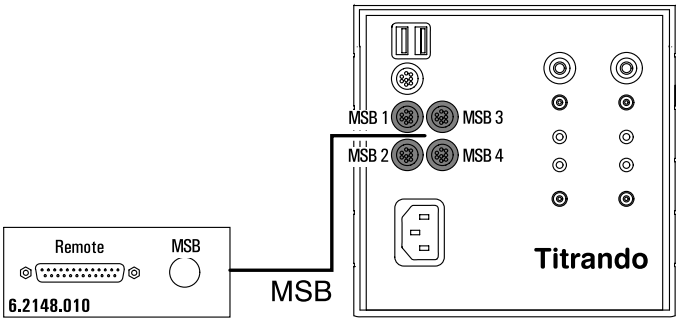


Fig. 13: Titrando – Remote box

For example, you can connect the 849 Level Control to the remote interface of the remote box. The remote box also has an MSB output, to which an additional instrument, e. g. a dosing device or stirrer, can be connected.

During a method run remote output lines are set automatically and the setting of input lines by a peripheral device can automatically trigger commands (e. g. start or stop). An exact description of the signals is given in the Instructions for Use for PC Control / Touch Control.

PC Control / Touch Control

If you have several remote boxes connected then you must remember that the particular remote box that is recognized first by the software (Touch Control or PC Control) will automatically be used as the "Control remote box". This means that lines will be set up and scanned automatically on this remote box. The current Control remote box is shown in the device manager under the Touch Control or PC Control properties (see Instructions for Use for PC Control / Touch Control).

2.5 Device connection at the USB

The Titrando has two USB connections (type A sockets) for connecting peripheral devices with a USB interface. The Titrando functions as the USB hub (distributor), regardless of whether you are using it with Touch Control or PC Control/*tiamo*. If you wish to attach more than two devices to a USB then you can also use an additional commercially available USB hub (see *Section 2.5.7*).

Attention!
If you are operating the Titrando with Touch Control then make sure that the Touch Control is switched off while you are setting up or breaking the connections between the instruments. If you are operating the Titrando with the PC software, end the program before setting up or breaking USB connections.

2.5.1 Connecting a printer

Printers to be connected to the Titrando operated by Touch Control must meet the following requirements:

- Printer language: HP-PCL, Canon BJL Commands or Epson ESC P/2
- Printer resolution 300 dpi or 360 dpi (Epson)
- A4 paper, single page feed.

Current printer models that can be connected are listed on the Internet under www.titrando.com.

To connect the printer proceed as follows:

☞ Switch off Touch Control.

☞ Use the 6.2151.020 cable to connect the USB connection of the Titrando (type A) to the USB connection of the printer (type B, see printer's operating manual).

☞ First switch on the printer and then the Touch Control.

☞ Configure the printer in the device manager of the Touch Control as described in the Instructions for Use for PC Control / Touch Control.

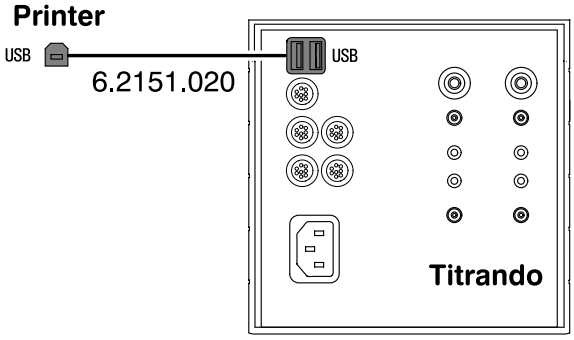


Fig. 14: Titrando – Printer

2.5.2 Connecting a balance

If you are operating the Titrando with the PC Control/*tiamo* software then connect the balance directly to the serial interface (COM) of the computer. This is normally 9-pin and marked with the symbol **IOIOI**. If you are operating the Titrando with the Touch Control then you need the 6.2148.020 USB-RS232 box to connect a balance.

The following table gives an overview of the balances that can be used together with the Titrando system and which cables you will need to connect the balance to the RS232 interface:

Balance	*Cables*
AND ER-60, 120, 180, 182 FR-200, 300 FX 200, 300, 320 with RS232 interface (OP-03)	6.2125.020 + 6.2125.010
Mettler AB, AG, PR (LC-RS9)	Supplied with balance
Mettler AM, PM, PE with interface option 016 or Mettler AJ, PJ with interface option 018	6.2146.020 + 6.2125.010 additionally from Mettler: ME 47473 Adapter and either ME 42500 Hand switch or ME 46278 Foot switch
Mettler AT	6.2146.020 + 6.2125.010 additionally from Mettler: ME 42500 Hand switch or ME 46278 Foot switch
Mettler AX, MX, UMX, PG, AB-S, PB-S	6.2134.120
Mettler AE with interface option 011 or 012	6.2125.020 + 6.2125.010 additionally from Mettler: ME 42500 Hand switch or ME 46278 Foot switch
Ohaus Voyager, Explorer, Analytical Plus	Cable AS017-09 from Ohaus
Precisa balances with RS232C interface	6.2125.080 + 6.2125.010
Sartorius MP8, MC1	6.2134.060
Shimadzu BX, BW	6.2125.080 + 6.2125.010

Operation with Touch Control

☞ Use the 6.2151.030 cable to connect the USB connection of the Titrando (type A) to the USB connection of the USB-RS232 box (type B).

☞ Connect one of the RS interfaces of the USB-RS232 box with the RS232 interface of the balance (see Table for cables).

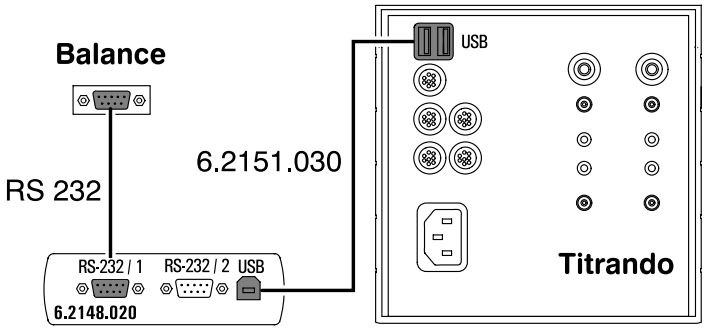


Fig. 15: Titrando – USB-RS232 box – Balance

☞ Switch on the Touch Control.

☞ Switch on the balance.

☞ Configure the RS232 interface of the balance.

☞ Configure the RS232 interface of the USB-RS232 box in the device manager of the Touch Control (see Instructions for Use for PC Control / Touch Control).

Operation with PC Control/*tiamo*

☞ Connect the RS232 interface of the computer with the RS232 interface of the balance (see Table for cables).

☞ Switch on the balance.

☞ Configure the RS232 interface of the balance.

☞ Configure the RS232 interface of the computer in the device manager of the PC Control software (see Instructions for Use for PC Control / Touch Control) or in the configuration dialog of *tiamo*.

2.5.3 Connecting a USB Sample Processor / Robotic Titrosampler

A USB Sample Processor or a Robotic Titrosampler can be controlled by Touch Control or PC Control/*tiamo*.

☞ Use the 6.2151.000 cable to connect the USB connection of the Titrando (type A) with the controller socket of the USB Sample Processors / Robotic Titrosampler.

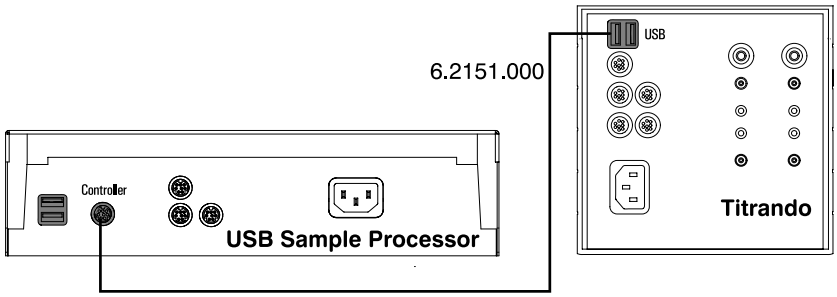


Fig. 16: Titrando –USB Sample Processor

☞ Start the PC Control/*tiamo* software or switch on the Touch Control. The USB Sample Processor / Robotic Titrosampler will be recognized automatically and entered in the device list of PC Control/*tiamo* or Touch Control.

☞ Configure the USB Sample Processor / Robotic Titrosampler in the device manager or the configuration dialog as described in the Instructions for Use for PC Control / Touch Control or *tiamo* respectively.

2.5.4 Connecting additional Titrandos or Dosing Interfaces

With the Touch Control or the PC Control software you can control up to three Titrandos or Dosing Interfaces. The *tiamo* software allows to expand the system with practically any number of control devices.

☞ Use the 6.2151.000 cable to connect the USB connection of the first Titrando / Dosing Interface (type A) with the controller socket of the second Titrando / Dosing Interface.

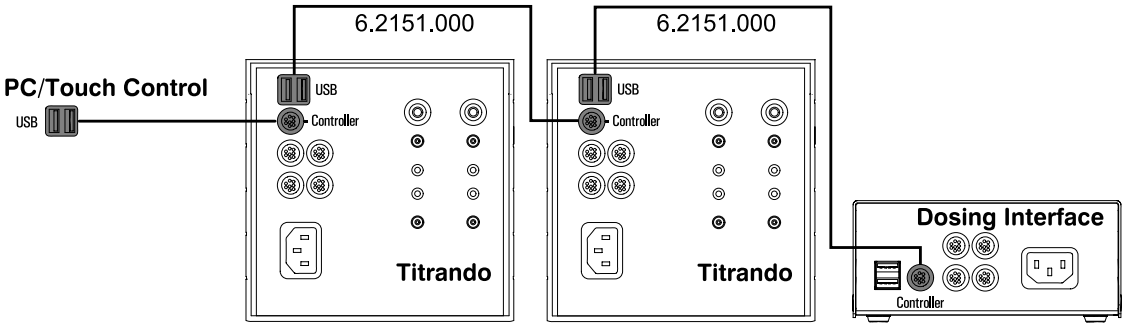


Fig. 17: Titrando – Titrando/Dosing Interface

☞ Switch on the Touch Control or start the PC Control/*tiamo* software. The Titrando / Dosing Interface will be recognized automatically and entered in the device list of PC Control/*tiamo* or Touch Control.

☞ Configure the Titrando / Dosing Interface in the device manager or the configuration dialog as described in the Instructions for Use for PC Control / Touch Control or *tiamo* respectively.

You can connect another Titrando or Dosing Interface in the manner described above.

Attention!
Connecting Titrandos/Dosing Interfaces via a commercially available USB hub is not possible.

2.5.5 Connecting a PC keyboard (Titrando with Touch Control only)

The PC keyboard is used as an aid for entering text and numbers. If you are operating the Titrando with the Touch Control then you can connect a PC keyboard with USB interface to the Titrando. Current keyboard models that can be connected are listed on the Internet under www.titrando.com.

☞ Connect the USB plug of the keyboard (type A) to one of the USB sockets of the Titrando.

☞ Switch on the Touch Control. The keyboard will be automatically recognized and entered in the device manager.

☞ Configure the keyboard in the device manager of the Touch Control as described in the Instructions for Use for PC Control / Touch Control.

2.5.6 Connecting a barcode reader

The barcode reader is used as an aid for entering text and numbers. You can connect a barcode reader with USB-interface. Current barcode reader models that can be connected are listed on the Internet under www.titrando.com.

Operation with Touch Control

☞ Connect the USB plug of the barcode reader (type A) to one of the USB sockets of the Titrando.

☞ Switch on the Touch Control. The barcode reader will be automatically recognized and entered in the device manager of the Touch Control.

☞ Configure the barcode reader in the device manager as described in the Instructions for Use for PC Control / Touch Control.

Operation with PC Control/*tiamo*

☞ Connect the USB plug of the barcode reader (type A) to one of the USB sockets of the Titrando or the computer.

☞ Start the PC Control or *tiamo* software.

☞ Configure the barcode reader in the device manager or the configuration dialog as described in the Instructions for Use for PC Control / Touch Control or *tiamo* respectively.

Settings on the barcode reader:

The operating instructions of the barcode reader describe the programming of the barcode reader.

☞ Bring the barcode reader into the programming mode.

☞ Set the required keyboard layout (USA, Germany, France, Spain, Switzerland (German)). This setting must be the same as the setting in the device manager (see Instructions for Use for PC Control / Touch Control).

☞ Make sure that the barcode reader is set so that Ctrl-characters (ASCII 00 to 31) can be transmitted.

☞ Program the barcode reader so that ASCII character 02 (STX or Ctrl B) is the first character to be transmitted. This first character is normally known as the "Preamble" or "Prefix code".

☞ Program the barcode reader so that ASCII character 04 (EOT or Ctrl D) is the last character to be transmitted. This last character is normally known as the "Postamble", "Record suffix" or "Postfix code".

☞ Terminate the programming mode.

2.5.7 Connecting a USB hub

If you would like to connect more than two devices to the USB connection of the Titrando then you can use an additional commercially available USB hub (distributor). If you are operating the Titrando with the Touch Control then you should use a self-powered USB hub.

☞ Switch off the Touch Control or close the PC Control/*tiamo* software.

☞ Use the 6.2151.020 cable to connect the USB connection of the Titrando (type A) with the USB connection of the hub (type B, see operating instructions of hub).

☞ Switch on the Touch Control or start the PC Control/*tiamo* software. The USB hub will be recognized automatically.

2.5.8 Connecting a Bluetooth® adapter

Printers and balances (or other instruments with RS232 connection) can be connected optionally via a wireless Bluetooth® connection. Models of printers and balances with integrated Bluetooth® functionality are recommended for this. Bluetooth® printer adapters for the USB port and Bluetooth® serial adapters for RS232 connections (e. g. for balances) are commercially available.

Note!
Bluetooth® is a registered and protected trademark of the Bluetooth® Special Interest Group (Bluetooth® SIG, Inc.).

PC Control and *tiamo*

If the Titrando system is operated with the PC Control/*tiamo* software, a Bluetooth USB adapter can be connected to a USB port of the computer (or of the Titrando/USB Sample Processor). The driver software (for MS Windows 2000/XP), supplied by the manufacturer of the Bluetooth adapter, must be installed as specified in the related instructions. A Bluetooth USB adapter must support the Bluetooth specifications **HCRP** (**Hardcopy Cable Replacement Profile** for printers) and/or **SPP** (**Serial Port Profile** for balances or RS232 connections). Printer drivers must be configured before installation of the Bluetooth adapter.

Touch Control

If the Titrando system is operated as a stand-alone system with an 840 Touch Control, the **Metrohm Bluetooth USB Adapter for 840** (6.2162.000, Bluetooth® V1.1 qualified Class 2 device) will be required for a Bluetooth connection.

Note!
*The **Metrohm Bluetooth USB Adapter** cannot be operated on a computer. The adapter is designed exclusively for use in a Titrando system in stand-alone mode, i. e. with a 840 Touch Control as control unit. The version 5.840.0130 or higher of the Touch Control software is required.*

The Metrohm Bluetooth USB adapter guarantees wireless data transfer over a distance of up to 10 m and is easy to install.

☞ Connect the Bluetooth adapter to a free USB port on the rear of the Titrando/USB Sample Processor.

☞ Switch on the Touch Control. The Bluetooth USB adapter is recognized automatically.

☞ Configure the adapter in the device manager of the Touch Control as described in the Instructions for Use for PC Control/Touch Control.

Printers and Bluetooth

A Bluetooth-enabled printer or a Bluetooth printer adapter must support the **HCRP Hardcopy Cable Replacement Profile**.

Please refer to the printer's User Manual for the settings required for a Bluetooth-enabled printer. Bluetooth printer adapters can normally be connected to the USB port of the relevant printer without the need for configuration. Please note what is said in the printer adapter's documentation. The printer type is defined in the device manager of Touch Control.

Balances and Bluetooth

A Bluetooth-enabled balance or a Bluetooth serial adapter must comply with the **SPP Serial Port Profile** in accordance with the Bluetooth specifications. If the manufacturer of the balance offers a specific Blue-

tooth serial adapter, this should be used instead of a commercially available adapter.

Bluetooth serial adapters must be configured on the PC using the utility program supplied by the manufacturer. The data transfer parameters of instrument and adapter must agree with each other. The Bluetooth serial adapter must be defined as Acceptor and not as Initiator of a serial connection. Authentication with a PIN code is not supported.

2.6 Sensor connection

One measuring interface consists of a high-impedance measuring input (Ind.) for pH, redox or ISE sensors, an input for a separate reference electrode (Ref.), a measuring input for temperature sensors (Temp.), e. g. Pt1000 or NTC and a measuring input for polarized electrodes (Pol.).

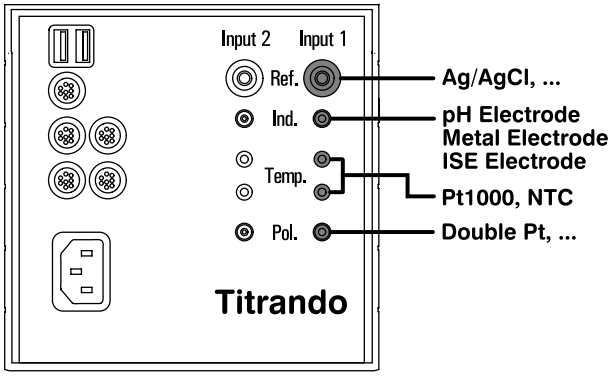


Fig. 18: Titrando – Sensors

2.6.1 Connecting an 854 iConnect

One or two external 854 iConnect measuring interfaces can be connected to an 857 Titrando depending on the Titrando's version.

☞ Connect the iConnect plug of the 854 iConnect to the socket "iConnect" of the 857 Titrando. Make sure that the mark on the plug points to the mark on the Titrando as shown in the figure.

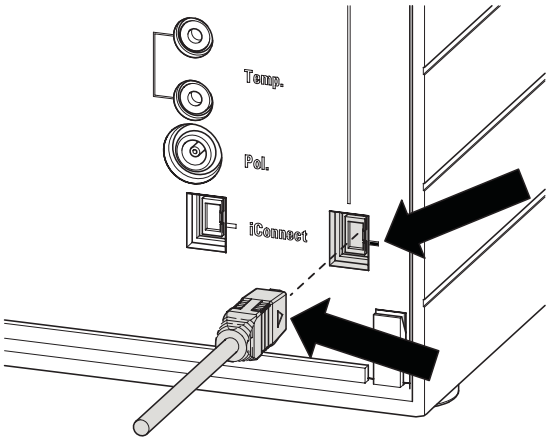


Fig. 19: Connecting the 854 iConnect

☞ The 854 iConnect is recognized automatically and entered as measuring input in the device properties of the Titrando.

The connection of sensors is described in the Instructions for Use of the 854 iConnect.

2.6.2 Differential potentiometry

During potentiometric measurements in poorly conducting media, high-impedance measuring sensors are affected by electrostatic and electromagnetic interferences. Use our **Solvotrode** 6.0229.100 or any other special electrode for pH measurements in organic solvents. If this does not help then you can connect a **Differential amplifier** 6.5104.030 (230 V) or 6.5104.040 (115 V).

The Differential amplifier is connected to the high-impedance measuring input (Ind.).

2.6.3 Titration vessel setup

In titration it is important that the solution is thoroughly mixed. The stirring rate should be high enough for a small vortex to be formed. If the stirring rate is too high then air bubbles will be entrained. This results in incorrect measurements. If the stirring rate is too low then the solution at the electrode will not be correctly mixed. To ensure that the measurement is made in a thoroughly mixed solution after titrant addition the buret tip should be located where the turbulence is greatest. In addition, the distance between the spot where the titrant is added and the electrode should be as large as possible. When positioning the electrode and buret tip you must also take the stirring direction into account.

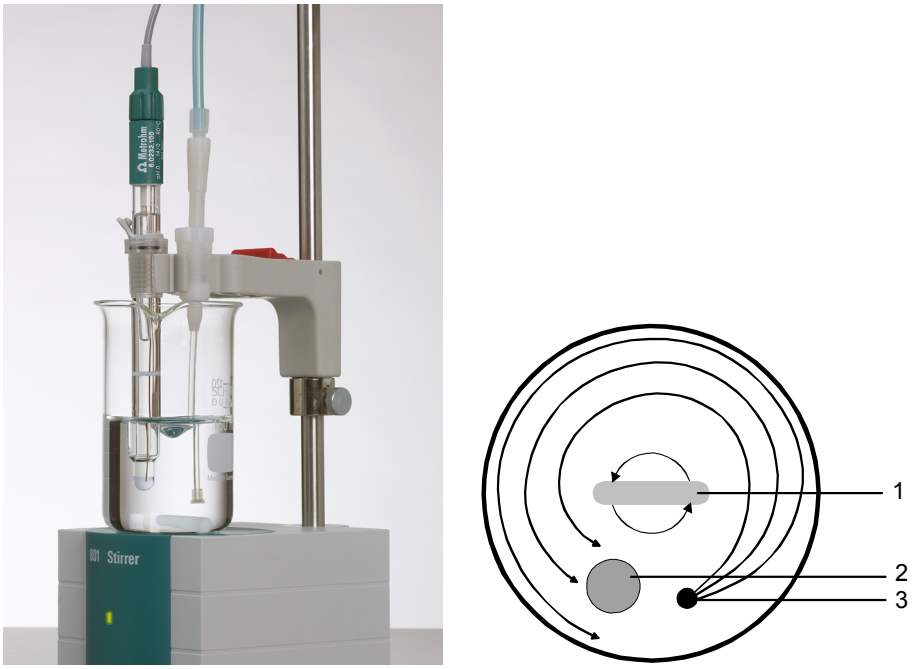


Fig. 20: Recommended arrangement of magnetic stirring bar (1), electrode (2) and buret tip (3)

2.6.4 Assembly of the Karl Fischer titration cell

Install the titration cell for volumetric KF titrations according to the following figures:

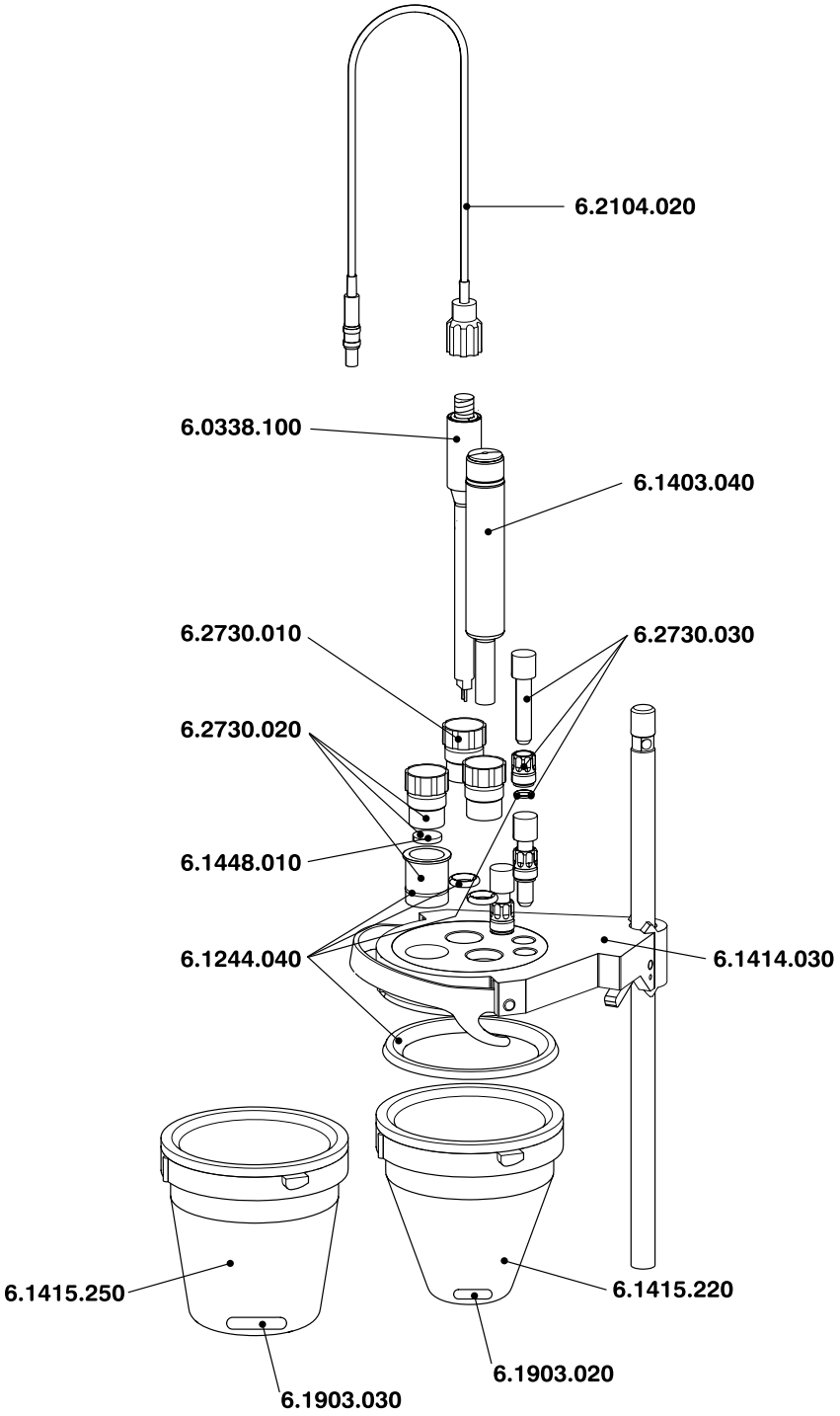


Fig. 21: Drawing of the KF titration cell 6.5609.000

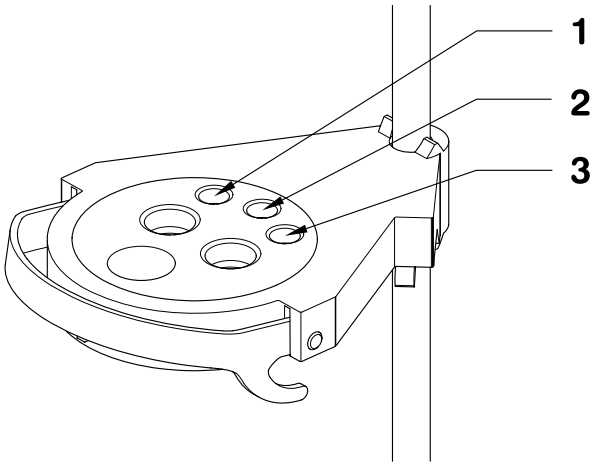


Fig. 22: Arrangement of transport tip, buret tip and draw-off tip

1 Position of the transport tip for solvent	**3 Position of the draw-off tip**
2 Position of the buret tip for KF reagent	

2.7 Update of the instrument software

The Update of the instrument software is described in the Instructions for Use for PC Control / Touch Control or in the *tiamo* help.

3 Troubleshooting

3.1 Problems

Problem	*Possible cause*	*Measures*
"On" LED does not light up although the Titrando is connected to the mains supply.	Either the Touch Control or the computer is not switched on, or the plugs are not plugged in correctly.	Check the plug connections and switch on the Touch Control or the computer.
Titrando with internal dosing drive only: **"Status" LED does not light up although an exchange unit is in place.**	The exchange unit has not been attached correctly.	Remove the exchange unit and push it on again until it clicks into position. The LED blinks while the data is being read out from an intelligent exchange unit (806) and is on continuously when the exchange unit has been recognized correctly.
Titrando with internal dosing drive only: **The exchange unit cannot be pushed into position.**	The exchange unit flat cock is not in the change position.	Move the flat cock manually to the change position (switch lever pointing to the right).
	The piston rod in the exchange unit is not in the correct position.	Move the piston rod to the correct position (see exchange unit Instructions for Use, Section "Attaching the exchange unit").
Titrando with internal dosing drive only: **The exchange unit cannot be removed and the "Status" LED blinks slowly.**	Dosing or filling is currently taking place and / or the Titrando is not in the change position.	Stop the run or carry out a "Fill" step.

Problem	*Possible cause*	*Measures*
Titrando with internal dosing drive only: **"Status" LED blinks rapidly.**	The dosing drive is overloaded because the flat cock is blocked.	Switch off the Touch Control or end PC Control/*tiamo*. Check whether the exchange unit can be removed. If it cannot be removed then check whether the flat cock can still be rotated. Move it manually to the change position by turning it to the right (see Instructions for Use of exchange unit). Remove the exchange unit and proceed as described in the Instructions for Use in the section "Servicing a blocked flat cock".
	The dosing drive is overloaded because the piston is blocked. The fault is indicated by the software (Touch Control or PC Control/*tiamo*).	Switch the control device off and then on again. The dosing device is initialized when switching on. Remove the exchange unit and clean it as described in the Instructions for Use in the section "Care and maintenance". Contact Metrohm Service if it is not possible to remove the exchange unit.
	The exchange unit data can no longer be read as the data chip has been damaged mechanically or by chemicals.	Have the data chip replaced by Metrohm Service personnel. In order to be able to use the exchange unit until the data chip is replaced you can remove the data chip yourself. The cylinder volume will still be recognized automatically, but data can no longer be read from or stored in the exchange unit.

4 Appendix

In this section you will find the most important technical data of the Titrando, a list of standard and optional accessories and the warranty and conformity declarations.

4.1 Technical data

Provided that nothing to the contrary is mentioned, the published values are typical technical data for the Titrandos with internal and external dosing drive.

4.1.1 Titration and measuring modes

DET	Dynamic equivalence point titration Controlled titrant addition with variable volume increments
MET	Monotonic equivalence point titration Titrant addition with fixed volume increments
SET	Titration to one or two predefined endpoints
KFT	Karl Fischer titration
STAT	Endpoint titration while holding the measured value constant
MEAS	Measurement (pH, potential, temperature, current (Upol), potential(Ipol) and concentration)

4.1.2 Measuring interfaces

1 or 2 galvanically separated measuring interfaces

Potentiometry

1 high-impedance measuring input for pH, redox and ISE electrodes

1 reference input for separate reference electrode

Input resistance	$> 1 * 10^{12}$ Ohm
Offset current	$< 1 * 10^{-12}$ A (under reference conditions)

Temperature

1 measuring input for temperature sensors (Pt1000 or NTC)
Automatic temperature compensation, for NTC sensors R (25 °C) and $B_{25/50}$ can be configured.

Polarizer

1 measuring input for polarized electrodes

Polarization current Ipol	–125.0 ... +125.0 µA in 2.5 µA steps
Polarization potential Upol	–1250 ... +1250 mV in 25 mV steps

Polarizer (857 only)

1 measuring input for polarized electrodes

Polarization current Ipol [1] –122.5 ... +122.5 µA in 2.5 µA steps
Polarization potential Upol [2] –1225 ... +1225 mV in 25 mV steps

[1] –125.0 / +125.0 µA: values not guaranteed, dependent on reference potential +2.5 V

[2] –1250 / +1250 mV: values not guaranteed, dependent on reference potential +2.5 V

4.1.3 Specification of the measuring inputs

	Measuring range	*Resolution*	Measuring accuracy [1]
pH	–20.000 ... +20.000	0.001 pH	± pH 0.003
Potential [2]	–2000 mV ... +2000 mV	0.1 mV	± 0.2 mV
Current [3]	–200 µA ... +200 µA	0.01 µA	–
Temperature *Pt1000* *NTC*	 –150 °C ... +250 °C –20 °C ... +250 °C [4]	 0.1 °C 0.1 °C	 ± 0.2 °C (Pt1000: –20 °C ... +150 °C)

[1] ± 1 digit, without sensor error, under reference conditions
[2] potentiometric and voltametric
[3] amperometric
[4] for a NTC-Sensor with R (25 °C) = 30'000 Ohm and B (25/50) = 4100 K.

Measuring cycle: 100 ms for all measuring ranges

4.1.4 Specification of the measuring inputs (857 only)

	Measuring range	*Resolution*	Measuring accuracy [1]
pH	–13.000 ... +20.000	0.001 pH	± pH 0.003
Potential [2]	–1200 mV ... +1200 mV	0.1 mV	± 0.2 mV
Current [3]	–120 µA ... +120 µA	0.01 µA	–
Temperature *Pt1000* *NTC*	 –150 °C ... +250 °C –5 °C ... +250 °C [4]	 0.1 °C 0.1 °C	 ± 0.2 °C (–20 °C... +150 °C) ± 0.6 °C (+10 °C... +40 °C)

[1] ± 1 digit, without sensor error, under reference conditions
[2] potentiometric and voltametric
[3] amperometric
[4] for a NTC-Sensor with R (25 °C) = 30'000 Ohm and B (25/50) = 4100 K.

Measuring cycle: 100 ms for all measuring ranges

4.1.5 Internal dosing device

Cylinder volume	1 mL, 5 mL, 10 mL, 20 mL or 50 mL
Exchange unit resolution	20'000 steps per cylinder volume
Accuracy	0.025% (typical) Complies with ISO/DIN Standard 8655-3

4.1.6 Interfaces

USB connections

USB ports	2 USB downstream ports (type A sockets), 500 mA each, for connection of peripheral devices such as printer, keyboard, barcode reader or USB-RS232 box (Metrohm Ordering no. 6.2148.020)

Controller connection

Controller port	USB upstream port with additional signals (mini DIN socket) for the connection of Touch Control or computer to control the Titrando.
Touch Control connection	With built-in Touch Control cable
Computer connection	With 6.2151.000 cable

MSB connections (MSB = Metrohm Serial Bus)

Dosing device	Connection of max. 3 external dosing devices of the type Dosimat or Dosino to Titrandos with internal dosing drive (MSB 2 to MSB 4) or 4 external dosing devices of the type Dosimat or Dosino to Titrandos without internal dosing drive (MSB 1 to MSB 4).
Stirrer	Connection of max. 4 stirrers Stirrer control: on/off; manual or coordinated with the titration procedure. 15 steps for speed and direction of rotation selectable.
Remote box	Connection of max. 4 remote box*es* Remote boxes are used to select and control external devices.

4.1.7 Mains connection

Voltage	100 ... 240 V (± 10%)
Frequency	50 ... 60 Hz
Power consumption	45 W
Fuses	electronic overload protection

4.1.8 Safety specifications

Construction and testing	According to EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1 protection class I
Safety information	The Installation Instructions contain safety information that must be observed by the user in order to ensure the safe operation of the instrument.

4.1.9 Electromagnetic compatibility (EMC)

Emission	Standards complied with: - EN/IEC 61326 - EN 55022 / CISPR 22
Immunity	Standards complied with: - EN/IEC 61326 - EN/IEC 61000-4-2 - EN/IEC 61000-4-3 - EN/IEC 61000-4-4 - EN/IEC 61000-4-5 - EN/IEC 61000-4-6 - EN/IEC 61000-4-11

4.1.10 Ambient temperature

Nominal working range	+5 °C ... +45 °C (at max. 85 % rel. humidity)
Automatic inside temperature monitoring	> 70 °C pre-alarm, > 75 °C alarm
Storage	–20 °C ... +60 °C
Transport	–40 °C ... +60 °C

4.1.11 Reference conditions

Ambient temperature	+25 °C (±3 °C)
Rel. humidity	≤ 60 %
Warmed-up condition	Instrument in operation for at least 30 min
Validity of data	After adjustment

4.1.12 Dimensions

Titrando with internal dosing drive

Housing material	Polybutylene terephthalate (PBT)
Width	142 mm
Height (without exch. unit)	164 mm
Height (with exch. unit)	approx. 450 mm
Depth	239 mm
Weight (without exch. unit)	2948 g

Titrando without internal dosing drive

Housing material	Polybutylene terephthalate (PBT)
Width	142 mm
Height	227 mm
Depth	231 mm
Weight	2817 g

4.1.13 Recycling and disposal

This product is covered by European Directive 2002/96/EC, WEEE – Waste from Electrical and Electronic Equipment.

The correct disposal of your old equipment will help to prevent negative effects on the environment and public health.

More details about the disposal of your old equipment can be obtained from your local authorities, from waste disposal companies or from your local dealer.

4.2 Standard equipment

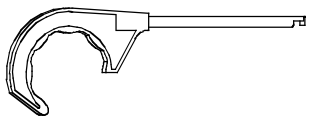
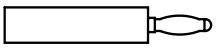
Immediately upon receipt of the Titrando please check that the delivery is complete. The illustrations in the accessory lists are not to the same scale.

4.2.1 808 Titrando

The 808 Titrando is available in the 2 following versions:

- 2.808.0010 808 Titrando with one measuring interface
- 2.808.0020 808 Titrando with two galvanically separated measuring interfaces

The information given in brackets refers to 2.808.0020.

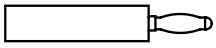
No.	*Order No.*	*Description*
1	1.808.0010 **or** 1.808.0020	808 Titrando with one measuring interface **or** 808 Titrando with two galvanically separated measuring interfaces
1	6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
1	6.2104.020	Connection cable for Metrohm electrodes with plug head length 1 m
1	6.2739.010	Key for exchange units 
1 (2) 1 (2)	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.2 809 Titrando

The 809 Titrando is available in the 2 following versions:

- 2.809.0010 809 Titrando with one measuring interface
- 2.809.0020 809 Titrando with two galvanically separated measuring interfaces

The information given in brackets refers to 2.809.0020.

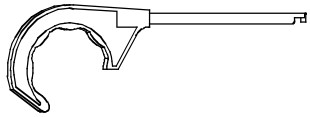
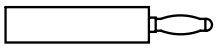
No.	*Order no.*	*Description*
1	1.809.0010 **or** 1.809.0020	809 Titrando with one measuring interface **or** 809 Titrando with two galvanically separated measuring interfaces
1	6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
1	6.2104.020	Connection cable for Metrohm electrodes with plug head length 1 m
2	6.2043.005	Holding clip for bottle 
1 (2) 1 (2)	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.3 835 Titrando

The 835 Titrando is available in the 2 following versions:

- 2.835.0010 835 Titrando with one measuring interface
- 2.835.0020 835 Titrando with two galvanically separated measuring interfaces

The information given in brackets refers to 2.835.0020.

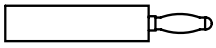
No.	*Order No.*	*Description*
1	1.835.0010 **or** 1.835.0020	835 Titrando with one measuring interface **or** 835 Titrando with two galvanically separated measuring interfaces
1	6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
1	6.2104.020	Connection cable for Metrohm electrodes with plug head length 1 m
1	6.2739.010	Key for exchange units 
1 (2) 1 (2)	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.4 836 Titrando

The 836 Titrando is available in the 2 following versions:

- 2.836.0010 836 Titrando with one measuring interface
- 2.836.0020 836 Titrando with two galvanically separated measuring interfaces

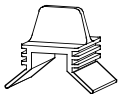
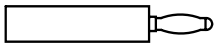
The information given in brackets refers to 2.836.0020.

No.	*Order no.*	*Description*
1	1.836.0010 **or** 1.836.0020	836 Titrando with one measuring interface **or** 836 Titrando with two galvanically separated measuring interfaces
1	6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
1	6.2104.020	Connection cable for Metrohm electrodes with plug head length 1 m
2	6.2043.005	Holding clip for bottle 
1 (2) 1 (2)	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.5 841 Titrando

The 841 Titrando is available in the following version:

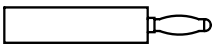
- 2.841.0010 841 Titrando with one measuring interface

No.	*Order no.*	*Description*
1	1.841.0010	841 Titrando with one measuring interface
1	6.5609.000	Karl Fischer titration equipment (see *Section 4.3.4* and *Fig. 21*)
2	6.2043.005	Holding clip for bottle 
1 1	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.6 842 Titrando

The 842 Titrando is available in the following version:

- 2.842.0010 842 Titrando with one measuring interface

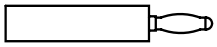
No.	*Order no.*	*Description*
1	1.842.0010	842 Titrando with one measuring interface
1	6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
1	6.2104.020	Connection cable for Metrohm electrodes with plug head length 1 m
2	6.2043.005	Holding clip for bottle 
1 1	6.2103.130 6.2103.140	Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket 
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.2.7 857 Titrando

The 857 Titrando is available in the 2 following versions:

- 2.857.0010 857 Titrando with one measuring interface for 854 iConnect
- 2.857.0020 857 Titrando with two galvanically separated measuring interfaces (one for 854 iConnect, one for 854 iConnect and conventional sensors)

The information given in brackets refers to 2.857.0020.

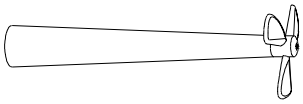
No.	*Order no.*	*Description*
1	1.857.0010 **or** 1.857.0020	857 Titrando with one measuring interface **or** 857 Titrando with two galvanically separated measuring interfaces
1	1.854.0010	854 iConnect measuring input
2	6.2043.005	Holding clip for bottle 
 1 1	 6.2103.130 6.2103.140	for 2.857.0020 only:  Adapter red Adapter black for temperature sensor 2 mm plug / 4 mm socket
1	 6.2122.020 6.2122.040 6.2122.070	Mains cable (plug to customer's specification) Type SEV 12 (Switzerland) Type CEE(7), VII (Germany,...) Type NEMA/ASA (USA,...)
1	8.840.1133	Installation Instructions for Titrando

4.3 Additional instruments and optional accessories

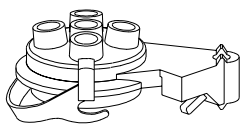
4.3.1 Controller for operating the Titrando

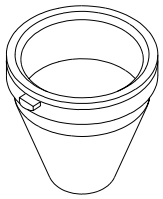
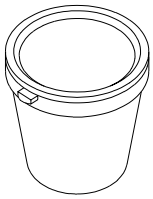
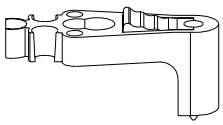
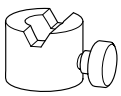
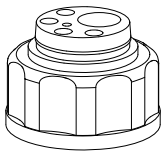
Order no.	*Description*
2.840.0100	Touch Control with touch-sensitive screen
6.6050.310	PC Control Software 4.1 for Titrando

4.3.2 Stirrers and titration stands

Order no.	*Description*
2.801.0040	801 Magnetic stirrer with stand and electrode holder for mounting on Titrando
2.801.0010	801 Magnetic stirrer without stand
2.804.0040	804 Titration stand for 802 Rod stirrer, with stand and electrode holder for mounting on Titrando
2.804.0010	804 Titration stand for 802 Rod stirrer, without stand
2.802.0040	802 Rod stirrer for 804 Titration stand
6.1909.010	Propeller stirrer, polypropylene (length from lower edge of SGJ: 96 mm) 
2.803.0010	803 Titration stand with magnetic stirrer and pump

4.3.3 Titration equipment

Order no.	*Description*
6.5609.000	Karl Fischer titration equipment (see *Fig. 21*)
6.5613.000	Eco titration equipment
6.1414.010	Titration vessel upper part for titration vessels 6.1415.xxx and 6.1418.xxx 5 openings, made of PPS 

Order no.	*Description*	
6.1415.22x	Titration vessel, 20 ... 90 ml 6.1415.220 clear glass 6.1415.223 amber glass	
6.1415.25x	Titration vessel, 50 ... 150 ml 6.1415.250 clear glass 6.1415.253 amber glass	
6.2021.020	Electrode holder, plastic	
6.2013.010	Clamping ring for 10 mm diameter support rods	
6.1602.190	Bottle adapter for tandem dosing 1 x NS14, 4 x M6	

4.3.4 Karl Fischer titration equipment 6.5609.000

Order no.	*Description*
6.0338.100	Double platinum wire electrode
6.1244.040	Sealing rings for 6.1414.030
6.1403.040	Drying tube with cover and O-ring
6.1414.030	KF titration vessel upper part
6.1415.220	Titration vessel 20 ... 90 mL
6.1415.250	Titration vessel 50 ... 150 mL
6.1448.010	Septum
6.1903.020	PTFE-stirring bar 16 mm
6.1903.030	PTFE-stirring bar 25 mm

Order no.	*Description*
6.2104.020	Electrode cable with F plug length 1 m
6.2412.000	Glass weighing spoon with protective tube
6.2730.010	Screw nipple
6.2730.020	Septum stopper 18 mm with O-ring
6.2730.030	Stopper with nipple and O-ring
6.2811.000	Molecular sieve 250 g; pore dimension: 0.3 nm

4.3.5 Dosing devices

Order no.	*Description*
2.805.0010	805 Dosimat
6.3026.110	806 Exchange unit with 1 mL glass cylinder
6.3026.150	806 Exchange unit with 5 mL glass cylinder
6.3026.210	806 Exchange unit with 10 mL glass cylinder
6.3026.220	806 Exchange unit with 20 mL glass cylinder
6.3026.250	806 Exchange unit with 50 mL glass cylinder
6.2244.020	Cards for 806 Exchange unit (10 pieces, assorted)
2.800.0010	800 Dosino
6.3032.120	807 Dosing unit with 2 mL glass cylinder
6.3032.150	807 Dosing unit with 5 mL glass cylinder
6.3032.210	807 Dosing unit with 10 mL glass cylinder
6.3032.220	807 Dosing unit with 20 mL glass cylinder
6.3032.250	807 Dosing unit with 50 mL glass cylinder
6.2061.010	Bottle holder for Dosinos (Reagent Organizer) for 2 bottles

4.3.6 Combined pH electrodes

Order no.	*Description*
6.0262.100	Ecotrode Plus Combined LL pH glass electrode with fixed ground-joint diaphragm
6.0256.100	Flat membrane electrode Combined LL pH glass electrode with fixed ground-joint diaphragm, for low immersion depths
6.0229.100	Solvotrode combined LL pH glass electrode ground diaphragm (PCTFE), reference electrolyte LiCl saturated in EtOH
6.0253.100	Aquatrode plus combined LL pH glass electrode
6.0255.100	Profitrode Combined LL pH glass electrode with ground diaphragm, double junction
6.0258.010	Unitrode with Pt1000 temperature sensor (2 mm plug), plug F
6.0259.100	Unitrode without temperature sensor

4.3.7 Combined metal electrodes

Order no.	*Description*
6.0430.100	Ag Titrode
6.0431.100	Pt Titrode
6.0450.100	Combined Ag ring electrode
6.0451.100	Combined Pt ring electrode
6.0452.100	Combined Au ring electrode

4.3.8 Ion-sensitive electrodes and surfactant electrodes

Order no.	*Description*
6.0502.140	Ion-sensitive electrode for Cu^{2+}
6.0502.150	Ion- sensitive electrode for F^{-}
6.0508.110	Ion- sensitive electrode for Ca^{2+}
6.0507.010	NIO surfactant electrode for nonionic surfactants

Order no.	Description
6.0507.120	"Ionic Surfactant" electrode for ionic surfactants
6.0507.130	Surfactrode Resistant for ionic surfactants
6.0507.140	Surfactrode Refill for ionic surfactants
6.0507.150	"Cationic Surfactant" electrode for ionic surfactants

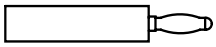
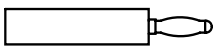
4.3.9 Karl Fischer electrodes

Order no.	Description
6.0338.100	Double platinum electrode

4.3.10 Reference electrodes

Order no.	Description
6.0726.100	Ag/AgCl reference electrode with ground-joint diaphragm
6.0726.107	Ag/AgCl reference electrode filled with c(KCl)=3 mol/L, with ground-joint diaphragm
6.0726.108	Ag/AgCl reference electrode filled with LiCl sat. in ethanol with ground diaphragm
6.0750.100	LL ISE Reference Ag/AgCl reference electrode with fixed ground-joint diaphragm, bridge electrolyte c(KCl) = 3 mol/L, length 133 mm, with Metrohm socket B

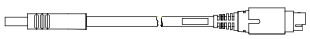
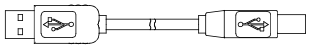
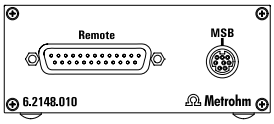
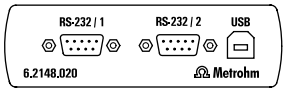
4.3.11 Temperature sensors

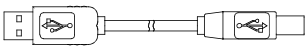
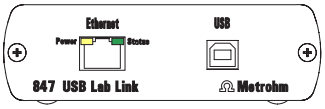
Order no.	Description
6.1110.100	Pt1000 resistance thermometer
6.2103.130	Adapter red for temperature sensor 2 mm plug / 4 mm socket 
6.2103.140	Adapter black for temperature sensor 2 mm plug / 4 mm socket 

4.3.12 Cables for electrodes and other accessories

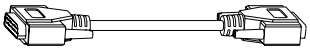
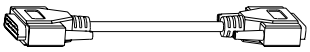
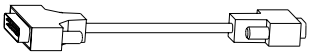
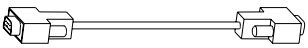
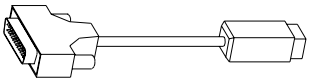
Order no.	*Description*
6.2104.020	Connection cable for Metrohm electrodes with plug head, length 1 m
6.2104.030	Connection cable for Metrohm electrodes with plug head, length 2 m
6.2104.140	Connection cable for resistance thermometer with 2 mm-plug, length 1 m
6.2104.150	Connection cable for resistance thermometer with 2 mm-plug, length 2 m
6.2106.020	Connection cable for reference electrodes, length 1 m
6.2106.060	Connection cable for reference electrodes, length 2 m
6.5104.030	Differential amplifier, 230 V Euro for measurements in poorly conducting solutions
6.5104.040	Differential amplifier, 115 V USA for measurements in poorly conducting solutions

4.3.13 Communication

Order no.	*Description*	
6.2151.000	Cable for connecting the control device (Titrando, Dosing Interface, Sample Processor, etc.) to a PC (USB connection, type A) and for connecting additional control devices USB A – Controller (1.8 m)	
6.2151.020	USB cable for connecting a printer (USB connection, type B) to the control device (Titrando, Dosing Interface, Sample Processor, etc.) (USB connection, type A) USB A – USB B (1.8 m)	
6.2148.010	Remote box MSB for connecting devices controlled by remote lines (e. g. Sample changer)	
6.2148.020	RS232 box USB (USB-RS232 box) for connecting devices with a serial RS232 interface (e. g. balances) to the USB connection of the control device (Titrando, Dosing Interface, Sample Processor, etc.)	

Order no.	*Description*	
6.2151.030	USB cable for connecting the USB-RS232 box to the control device (Titrando, Dosing Interface, Sample Processor, etc.) (USB connection, type A) USB A – USB B (30 cm)	
6.2134.040	Cable for connecting a computer to the USB-RS232 box 9 p./f – 9 p./f (3 m)	
2.847.0010	847 USB Lab Link for connecting the Touch Control to a computer network	

4.3.14 Cables for balances

Order no.	*Description*	
6.2125.010	Adapter cable 25-pin to 9-pin 9 p./f – 25 p./m (30 cm)	
6.2125.020	Cable for Mettler balances with interface 011 or 012 and AND-balances 25 p./f – 25 p./m (3 m)	
6.2125.080	Cable for Precisa and Shimadzu balances 25 p./f – 25 p./m (2 m)	
6.2134.060	Cable for Sartorius balances 25 p./m – 9 p./f (2 m)	
6.2134.120	Cable for Mettler AX/MX/UMX/PG and AB-S balances 9 p./f – 9 p./m (1.8 m)	
6.2146.020	Cable for Mettler AT/AM/PM balances 25 p./m – Mettler plug (2 m)	

4.4 Warranty and conformity

4.4.1 Warranty

The warranty on our products is limited to defects that are traceable to material, construction or manufacturing error that occur within 12 months from the day of delivery. In this case the defects will be rectified in our workshops free of charge. Transport costs are to be paid by the customer.

For day and night operation the warranty is limited to 6 months.

Glass breakage in the case of electrodes or other parts is not covered by the warranty. Checks that are not a result of material or manufacturing faults are also charged during the warranty period. For parts from outside manufacturers, insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.

With the regard to the guarantee of accuracy the technical specifications in the instruction manual are authoritative.

Concerning defects in materials, construction or design as well as the absence of guaranteed features the purchaser has no rights or claims except those mentioned above.

If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. Lack of an official damage report releases Metrohm from any liability to pay compensation.

If any instruments and parts have to be returned then the original packaging should be used if at all possible. This applies above all to instruments, electrodes, buret cylinders and PTFE pistons. Before embedment in wood shavings or similar material the parts must be packed in a dustproof package (for instruments the use of a plastic bag is essential). If open assemblies are included that are sensitive to electromagnetic voltages (e. g. data interfaces, etc.) then these must be returned in the associated original protective packaging (e. g. conductive protective bag). (Exception: assemblies with a built-in voltage source belong in non-conductive protective packaging).

For damage that arises as a result of non-compliance with these instructions no warranty responsibility whatsoever will be accepted by Metrohm.

4.4.2 Declaration of Conformity for 808 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

808 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a computer with PC Control/*tiamo* software. It is equipped with an internal dosing device. Three additional external dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.3 Declaration of Conformity for 809 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

809 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a PC with PC Control/*tiamo* software. Four dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.4 Declaration of Conformity for 835 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

835 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a computer with PC Control/*tiamo* software. It is equipped with an internal dosing device. Three additional external dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.5 Declaration of Conformity for 836 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

836 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a PC with PC Control/*tiamo* software. Four dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.6 Declaration of Conformity for 841 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

841 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a PC with PC Control/*tiamo* software. Four dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.7 Declaration of Conformity for 842 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

842 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a PC with PC Control/*tiamo* software. Four dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.8 Declaration of Conformity for 857 Titrando

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity

857 Titrando

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
www.metrohm.com

Description Universal titrator, controlled by a Touch Control or a PC with PC Control/*tiamo* software. Four dosing devices can be connected directly.

This instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission
EN/IEC 61326, EN 55022 / CISPR 22

Electromagnetic compatibility: Immunity
EN/IEC 61326, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-11

Safety specifications
EN/IEC/UL 61010-1, CSA-C22.2 No. 61010-1, protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

CE *The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

EN 61326 Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, 26 June, 2006

D. Strohm
Vice President
Head of R&D

Ch. Buchmann
Vice President
Head of Production
Responsible for Quality Assurance

4.4.9 Quality Management Principles

Metrohm Ltd., CH-9101 Herisau, Switzerland

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
E-Mail info@metrohm.com
Internet www.metrohm.com

Metrohm Ltd. holds the ISO 9001 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

The implementation of the ISO 9001 quality system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

Instrument development

The organization of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i. e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organization is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Operational Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

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