890 Titrando

Manual

8.890.8002EN

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Although all the information given in this documentation has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please send us your comments using the address given above.

Documentation in additional languages can be found on *http://products.metrohm.com* under **Literature/Technical documentation**.

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1 Introduction

1.1 The Titrando system

The Titrando is the core of the modular Titrando system. Operation is carried out by a Touch Control with touch-sensitive screen ("Stand alone" titrator) or by a computer with a corresponding software.

A Titrando system can contain numerous, various kinds of devices. The following figure provides an overview of the peripheral devices you can connect to the 890 Titrando.

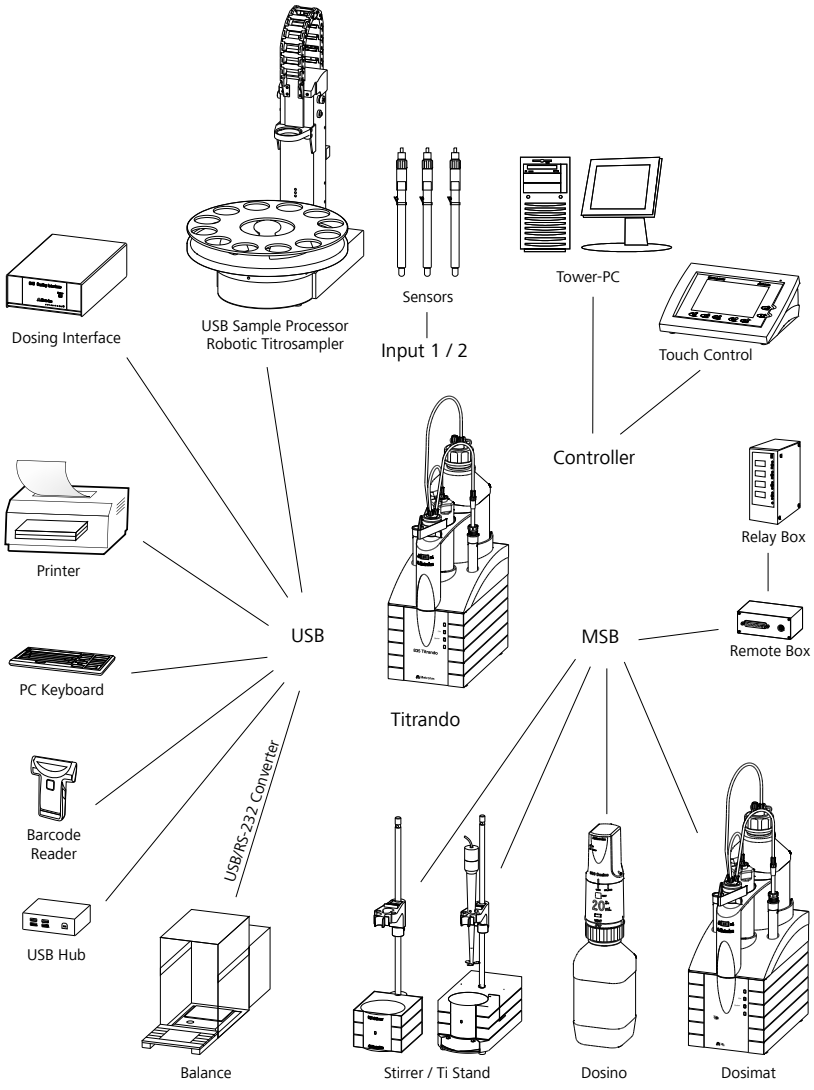


Figure 1 The Titrando system

Up to three control devices (Titrandos, Dosing Interfaces, USB Sample Processors etc.) can be controlled via USB connection by PC Control/Touch

Control. With the tiamo software the system can arbitrarily be extended with control devices.

You can request information on special applications in the "Application Bulletins" and "Application Notes"; available free of charge via the Metrohm agent responsible. Various monographs on the subjects of titration techniques and electrodes are also available.

Updating the device software is described in the manual for PC Control/ Touch Control or in the tiamo help, respectively.

1.2 Instrument description

The 890 Titrando has the following characteristics:

- **Operation**
  Operation is carried out by means of a touch-sensitive Touch Control or with a high-performance PC software, e.g. tiamo.
- **Dosing**
  An internal dosing drive for exchange units.
- **MSB connectors**
  Four MSB connectors (Metrohm Serial Bus) to control dosing devices (Dosimat with exchange unit or Dosino with dosing unit), stirrer or titration stand and remote boxes.
- **USB connectors**
  Two USB connectors, through which devices such as printers, PC keyboards, barcode readers or additional control devices (Titrando, USB Sample Processor, Dosing Interface, etc.) can be connected.
- **Measuring interface**
  A measuring interface with a connector for polarizable electrodes.

1.3 Titration modes — Measuring modes — Dosing commands

- **KFT**
  Karl Fischer titration for determining water with automatic pre- and post-conditioning. As measuring mode can be selected:
  - **Ipol** (voltametric measurement with adjustable polarization current)
  - **Upol** (amperometric measurement with adjustable polarization voltage)
- **MEAS**
  As measuring mode can be selected:
  - **Ipol** (voltametric measurement with adjustable polarization current)
  - **Upol** (amperometric measurement with adjustable polarization voltage)

- **Dosing commands**
  The following commands for dosing can be selected:
  - **ADD** (adding a predefined volume)
  - **PREP** (rinsing cylinder and tubings of an exchange or dosing unit)
  - **EMPTY** (for emptying cylinder and tubings)

1.4 Instrument versions

The 890 Titrando is available in two different instrument versions:

2.890.0110	Titrando with Touch Control
2.890.0210	Titrando with tiamo light

1.5 About the documentation

Caution

Please read through this documentation carefully before putting the instrument into operation. The documentation contains information and warnings which have to be followed by the user in order to ensure safe operation of the instrument.

1.5.1 Symbols and conventions

The following symbols and styles are used in this documentation:

*(5-**12**)*	**Cross-reference to figure legend** The first number refers to the figure number, the second to the instrument part in the figure.
1	**Instruction step** Carry out these steps in the sequence shown.
	**Warning** This symbol draws attention to a possible life hazard or risk of injury.
	**Warning** This symbol draws attention to a possible hazard due to electrical current.

	**Warning** This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	**Warning** This symbol draws attention to a possible biological hazard.
	**Caution** This symbol draws attention to a possible damage of instruments or instrument parts.
	**Note** This symbol marks additional information and tips.

1.6 Safety instructions

1.6.1 General notes on safety

Warning

This instrument may only be operated in accordance with the specifications in this documentation.

This instrument has left the factory in a flawless state in terms of technical safety. To maintain this state and ensure non-hazardous operation of the instrument, the following instructions must be observed carefully.

1.6.2 Electrical safety

The electrical safety when working with the instrument is ensured as part of the international standard IEC 61010.

Warning

Only personnel qualified by Metrohm are authorized to carry out service work on electronic components.

Warning

Never open the housing of the instrument. The instrument could be damaged by this. There is also a risk of serious injury if live components are touched.

There are no parts inside the housing which can be serviced or replaced by the user.

Mains voltage

Warning

An incorrect mains voltage can damage the instrument.

Only operate this instrument with a mains voltage specified for it (see rear panel of the instrument).

Protection against electrostatic charges

Warning

Electronic components are sensitive to electrostatic charges and can be destroyed by discharges.

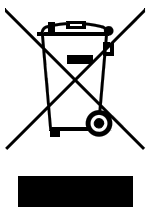
Always pull the mains cable out of the mains connection socket before connecting or disconnecting electrical appliances on the rear panel of the instrument.

1.6.3 Working with liquids

Caution

Periodically check all system connections for leaks. Observe the relevant regulations in respect to working with flammable and/or toxic fluids and their disposal.

1.6.4 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.

2 Overview of the instrument

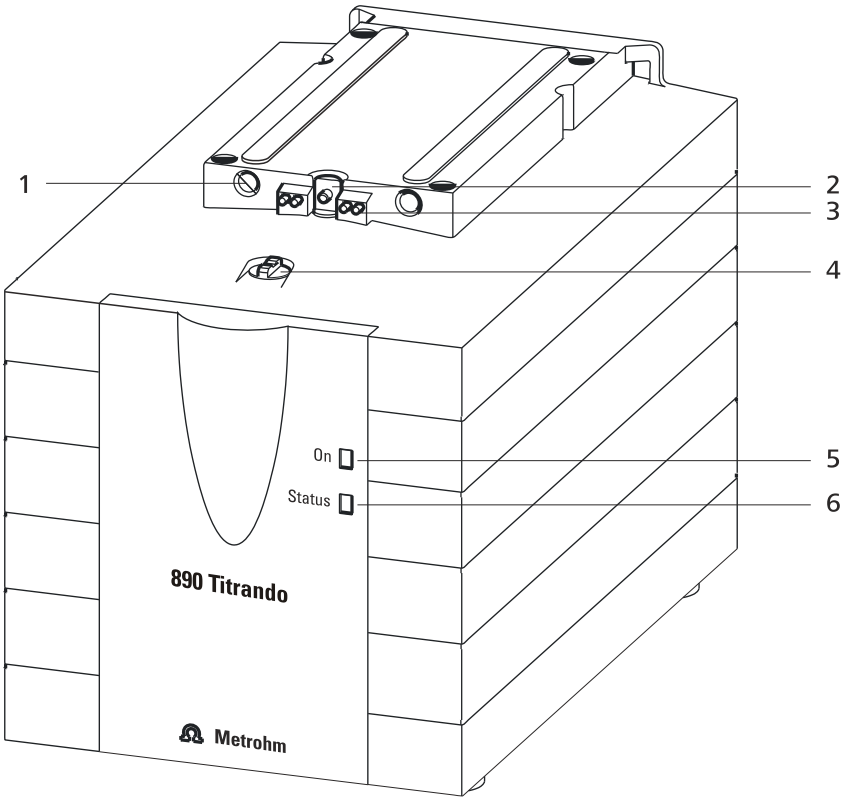


Figure 2 Front 890 Titrando

1 **Guide openings** For centering the exchange unit.	**2** **Spindle** Moves the piston of the exchange unit up and down.
3 **Contact pins** For the data chip.	**4** **Coupling** For switching the flat cock.
5 **LED "On"** Lights up when the Titrando and a controller (Touch Control or computer) are connected to the mains and switched on.	**6** **LED "Status"** Indicates the current status of the internal dosing drive.

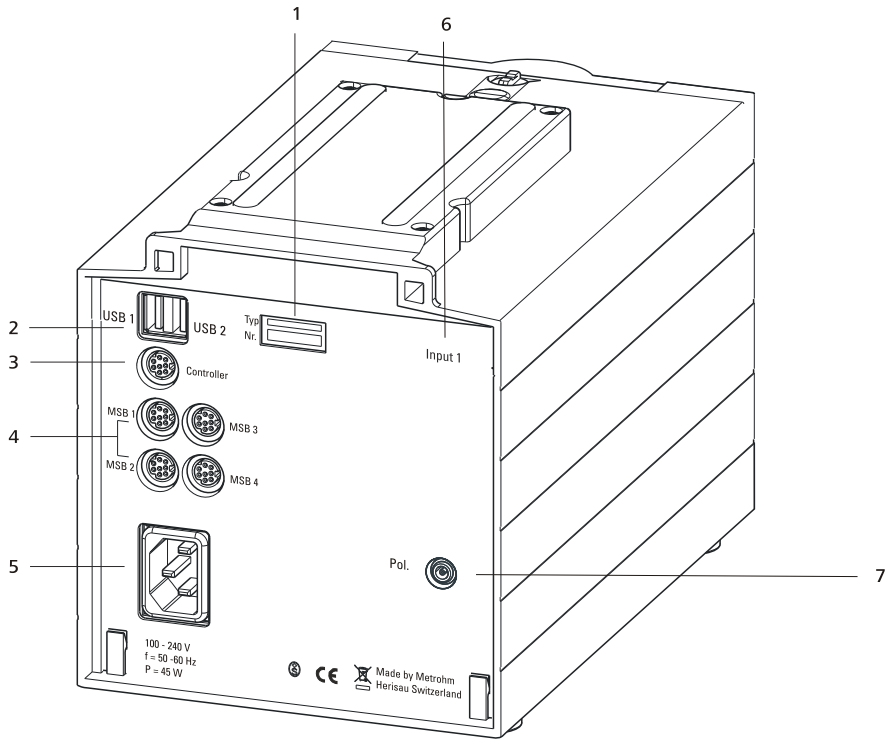


Figure 3 Rear 890 Titrando

1 Type plate
Contains specifications concerning mains voltage, instrument type and serial number.

2 USB connector (USB 1 and USB 2)
USB ports (type A) for connecting printer, keyboard, barcode reader, additional Titrandos, USB Sample Processor, etc.

3 Controller connector (Controller)
Connection of a Touch Control or PC with installed PC software. Mini DIN, 9-pin.

4 MSB connector (MSB 1 to MSB 4)
Metrohm Serial Bus. For connecting external dosing devices, stirrers to remote boxes. Mini DIN, 9-pin.

5 Mains connection socket

6 Measuring interface 1 (Input 1)

7 Electrode connector (Pol.)
For connecting polarizable electrodes, e.g. double Pt electrodes. Socket F.

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

The instrument is supplied in highly protective special packaging together with the separately packed accessories. Keep this packaging, as only this ensures safe transportation of the instrument.

3.1.2 Checks

Immediately after receipt, check whether the shipment has arrived complete and without damage by comparing it with the delivery note.

3.1.3 Location

The instrument has been developed for operation indoors and may not be used in explosive environments.

Place the instrument in a location of the laboratory which is suitable for operation, free of vibrations, protected from corrosive atmosphere, and contamination by chemicals.

The instrument should be protected against excessive temperature fluctuations and direct sunlight.

3.2 Connecting controller

3.2.1 Operation

Two different versions are available for operating the 890 Titrando:

- With a Touch Control with a touch-sensitive screen. It forms a "stand-alone" instrument together with the 890 Titrando.
- A computer enables handling of the 890 Titrando with the aid of a PC software, e.g. PC Control.

Caution

Take care to ensure that the mains cable is pulled out of the mains connection socket before either setting up or disconnecting connections between the instruments.

3.2.1.1 Connecting a Touch Control

Connect the Touch Control as follows:

1

Note

The plug is protected against accidental disconnection of the cable by means of a "pull-out protection" feature. If you wish to pull out the plug, you will first need to pull back the outer plug sleeve marked with arrows.

Insert the plug of the Touch Control connection cable into the controller socket.

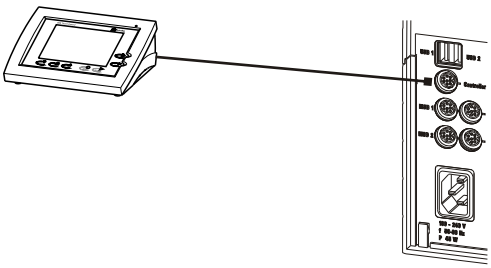


Figure 4 Connecting a Touch Control

2 **Connect all peripheral devices.**

- Connect MSB devices *(see Chapter 3.3, page 13)*
- Connect USB devices *(see Chapter 3.4, page 17)*

3 Connect the Titrando to the mains.

4 Switch on the Touch Control.

The Touch Control power supply is supplied through the Titrando. At the time of switch on system tests are run automatically on both the Titrando and the Touch Control. The LED **On** on the front of the Titrando lights up when the system test has been completed and the instrument is ready for operation.

Caution

The Touch Control must be shut down properly by switching off with the ON/OFF switch on the rear of the instrument before the current supply is interrupted. If this is not done, then there is a danger of data loss. Because of the fact that the power supply for the Touch Control is provided through the Titrando, you must never separate the Titrando from the mains (e.g. by switching off with a connector strip) before you have switched off the Touch Control.

If you would prefer not to position the Touch Control directly next to the Titrando, then you can lengthen the connection between Titrando and Touch Control using the 6.2151.010 cable. The maximum connection length permitted is 5 m.

3.2.1.2 Connecting a computer

The 890 Titrando requires a USB connection to a computer in order to be able to be controlled by a PC software. When a controller cable 6.2151.000 is used, the instrument can be connected directly, either to a USB socket on a computer, to a connected USB hub or to a different Metrohm control instrument.

Cable connection and driver installation

A driver installation is required in order to ensure that the 890 Titrando is recognized by the PC software. To accomplish this, you must comply with the procedures specified. The following steps are necessary:

1 Install software

- Insert the PC software installation CD and carry out the installation program directions.
- Exit the program if you have started it after the installation.

2 Establish cable connections

- Connect all peripheral devices to the instrument.
  - Connect MSB devices *(see Chapter 3.3, page 13)*
  - Connect USB devices *(see Chapter 3.4, page 17)*
- Connect the instrument to the mains supply if you have not already done this.
  The LED **On** on the 890 Titrando is not yet illuminated!
- Connect the instrument to a USB connector (Type A) of your computer (see manual of your computer). The 6.2151.000 cable is used for this purpose.

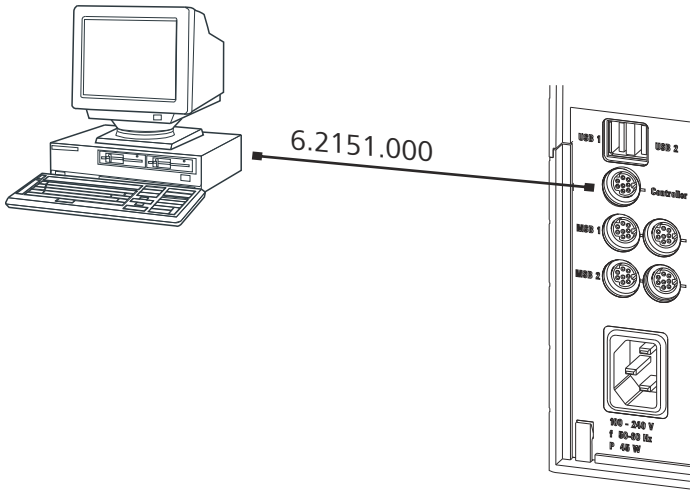


Figure 5 Connecting a computer

For Windows 2000: the instrument is recognized and the driver is installed automatically.

For Windows XP: the instrument is recognized and the installation assistant for the driver is started automatically. Select the option "Install software automatically" and click on **[Next >]**. Exit the assistant with **[Finish]**.

For Windows Vista: the instrument is recognized and the installation assistant for the driver is started automatically. Select the option "Find and install driver software". Agree to all of the requests that follow. The installation assistant will be exited automatically.

The **On** LED on the 890 Titrando lights up when the driver installation has been exited and the device is ready for operation.

Note

The plug on the instrument end of the 6.2151.000 controller cable is protected against accidental disconnection by means of a pull-out protection feature. If you wish to pull out the plug, you will first need to pull back the outer plug sleeve marked with arrows.

Registering and configuring the instrument in the PC software

The instrument must be registered in the configuration of your PC software. Once that has been done, you can then configure it according to your requirements. Proceed as follows:

1 Set up the instrument

- Start up PC software.
  The instrument is recognized automatically. The configuration dialog for the instrument is displayed.
- Make configuration settings for the instrument and its connectors.

More detailed information concerning the configuration of the instrument can be found in the documentation for the respective PC software.

3.3 Connecting MSB devices

In order to connect MSB devices, e.g. stirrers or dosing devices, Metrohm instruments are equipped with up a maximum of four connectors at what is referred to as the *Metrohm Serial Bus* (MSB). Various kinds of peripheral devices can be connected in sequence (in series, as a "daisy chain") at a single MSB connector (8-pin Mini DIN socket) and controlled simultaneously by the respective control instrument. In addition to the connection cable, stirrers and the remote box are each equipped with their own MSB socket for this purpose.

The following illustration provides an overview of the devices that can be connected to an MSB socket, along with a number of different cabling variations.

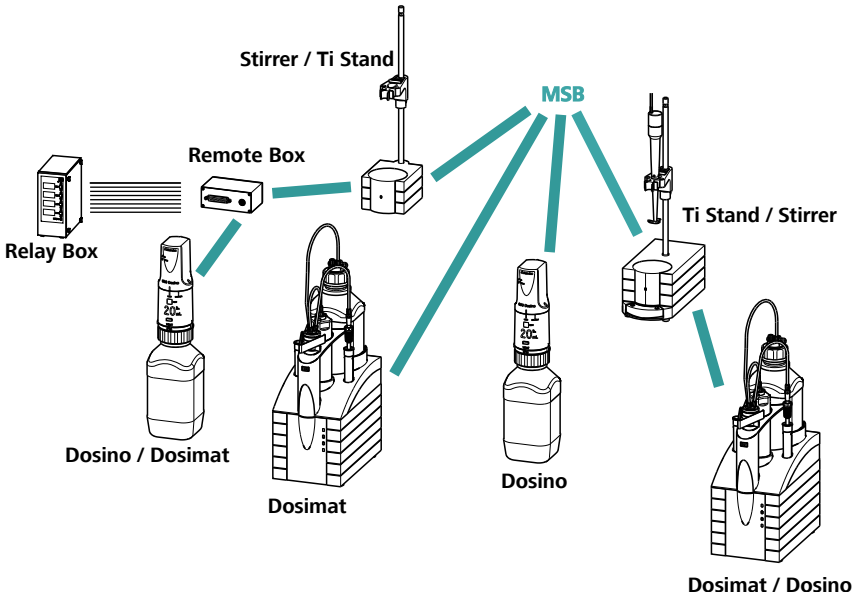


Figure 6 MSB connectors

The question of which peripheral devices are supported depends on the control instrument.

Note

When connecting MSB devices together, the following must be observed:

- Only one device of the same type can be used at a single MSB connector at one time.
- Type 700 Dosino and 685 Dosimat dosing devices cannot be connected together with other MSB instruments on a shared connector. These dosing devices must be connected separately.

Caution

Exit the control software before you plug MSB instruments in. The control instrument recognizes when it is switched on which instrument is connected at which MSB connector. The operating unit or the control software enters the connected MSB devices into the system configuration (Device manager).

MSB connections can be extended with the 6.2151.010 cable. The length of the connection must not exceed a maximum of 15 m.

3.3.1 Connecting dosing devices

Three dosing devices can be connected to the instrument (**MSB 2 to MSB 4**).

The types of dosing devices that are supported are:

- 800 Dosino
- 700 Dosino
- 805 Dosimat
- 685 Dosimat

Proceed as follows:

1 Connect a dosing device

- Exit the control software.
- Connect the connection cable to one of the sockets marked with **MSB** on the rear of the control instrument.
- Start the control software.

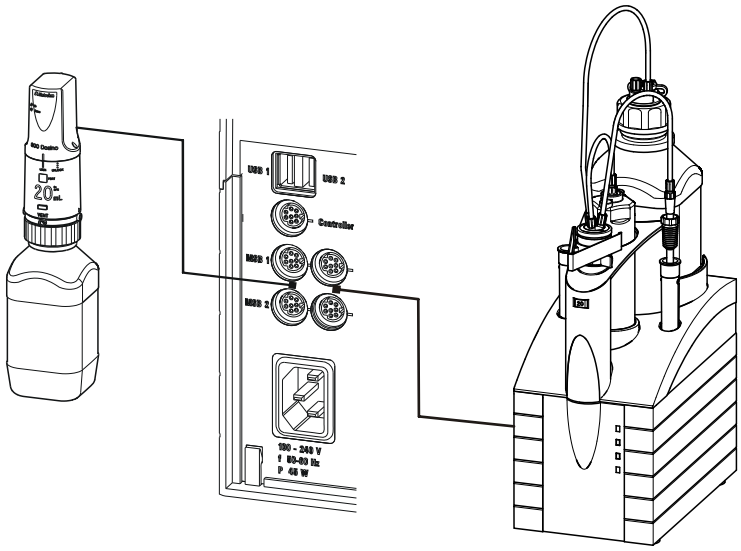


Figure 7 Connecting a dosing device

If you connect a stirrer and a dosing device of the type 800 Dosino (or 805 Dosimat), then it is to be recommended to connect the stirrer to **MSB 1** and the dosing device to the MSB connector of the stirrer, as these correspond to the default settings in the method templates.

3.3.2 Connecting a stirrer or titration stand

You can use a magnetic stirrer 801 Stirrer or 803 Ti Stand (stirring "from below") or the 804 Ti Stand with a rod stirrer 802 Stirrer (stirring "from above").

Connect a stirrer or a titration stand as follows:

1 Connect a stirrer or titration stand

- Exit the control software.
- Connect the connection cable of the magnetic stirrer or of the titration stand to one of the sockets marked with **MSB** on the rear of the control instrument.
- If desired, connect the rod stirrer to the stirrer socket (with stirrer symbol) of the titration stand.
- Start the control software.

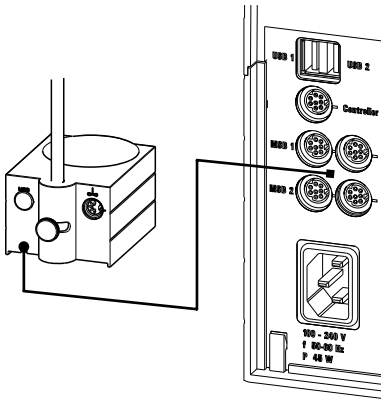


Figure 8 Connecting an MSB stirrer

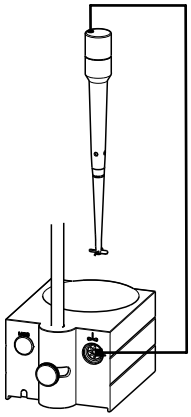


Figure 9 Rod Stirrer and titration stand

3.3.3 Connecting a remote box

Instruments that are controlled via remote lines and/or which send control signals via remote lines can be connected using the 6.2148.010 remote box. In addition to Metrohm, other instrument manufacturers also use similar connectors that make it possible to connect different instruments together. These interfaces are also frequently given the designations "TTL Logic", "I/O Control" or "Relay Control" and generally have a signal level of 5 volts.

Control signals are understood to be electrical line statuses or brief (> 200 ms) electrical pulses which display the operational state of an instrument or which trigger or report an event. Sequences on a variety of instruments can thus be coordinated in a single complex automation system. No exchange of data is possible, however.

Proceed as follows:

1 Connect a remote box

- Exit the control software.

- Connect the remote box connection cable to one of the sockets marked with **MSB** on the rear of the control instrument.
- Start the control software.

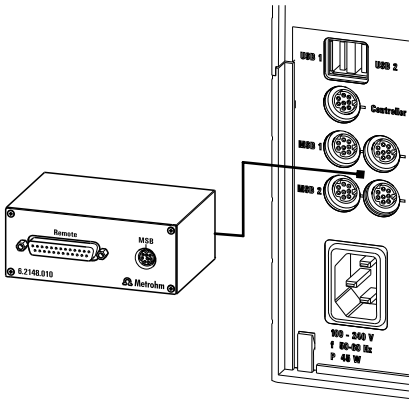


Figure 10 Connecting a remote box

You can, for example, connect an 849 Level Control Box (fill level monitor in a waste canister) or a 731 Relay Box (switch box for 230/110 volt alternating current sockets and low-voltage direct current outlets). The remote box also has an MSB socket at which a further MSB instrument, e.g. a dosing device or a stirrer, can be connected.

You will find precise information concerning the pin assignment of the interface on the remote box in Appendix *(see Chapter 7.1, page 32)*.

3.4 Connecting USB devices

3.4.1 General

The 890 Titrando has two USB connectors (type A sockets) for peripheral devices with USB interfaces. The Titrando functions as a USB hub (distributor) no matter how it is operated. If you wish to connect more than two devices to the USB, you can also use an additional commercially available USB hub .

Caution

If you operate the Titrando with the aid of the Touch Control, take care to ensure that the Touch Control is switched off when you set up or disconnect connections between the various instruments. If you use a PC software to control the Titrando, you should exit the program before you set up or disconnect the USB connections.

3.4.2 Connecting a printer

Printers that are connected to the 890 Titrando with Touch Control must meet the following requirements:

- Printer languages: HP-PCL, Canon BJL Commands or Epson ESC P/2
- Printer resolution: 300 dots/inch or 360 dots/inch (Epson)
- Paper format: A4 or Letter, single-sheet feed.

Currently connectable printer models can be found on the Internet under *www.titrando.com*.

Connect the printer as follows:

1. Switch off the Touch Control.
2. With the aid of the 6.2151.020 cable, connect the USB connector of the Titrando (type A) with the USB connector of the printer (type B, see manual for the printer).
3. Switch on the printer first, then the Touch Control.
4. Configure the printer in the device manager of the Touch Control (see manual for PC Control/Touch Control).

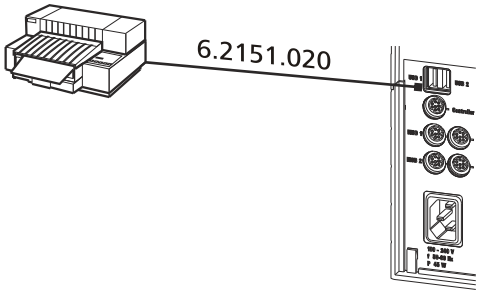


Figure 11 Connecting a printer

3.4.3 Connecting a balance

If you control the 890 Titrando with a PC software, connect the balance directly to the serial port (COM) on the computer. This is usually 9-pin and marked with the symbol **IOIOI**. If you operate the Titrando with the help of the Touch Control, you will need the 6.2148.020 RS-232/USB Box for connecting a balance.

The following table offers an overview of the balances that you can use together with the Titrando system and of which cable you will need for connection to the RS-232 interface:

Balance	Cable
AND ER-60, 120, 180, 182FR-200, 300FX 200, 300, 320 with RS-232 interface (OP-03)	6.2125.020 + 6.2125.010
Mettler AB, AG, PR (LC-RS9)	In the scope of delivery for the balance
Mettler AM, PM, PE with interface option 016 or Mettler AJ, PJ with interface option 018	6.2146.020 + 6.2125.010 also from Mettler: ME 47473 adapter and either ME 42500 hand switch or ME 46278 foot switch
Mettler AT	6.2146.020 + 6.2125.010 also 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 also from Mettler: ME 42500 hand switch or ME 46278 foot switch
Ohaus Voyager, Explorer, Analytical Plus	Cable AS017-09 from Ohaus
Precisa balances with RS-232-C 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

Connect the balance as follows:

1 With the aid of the 6.2151.030 cable, connect the USB connector of the Titrando (type A) with the USB connector of the RS-232/USB Box (type B).

2 Connect one of the RS-interfaces of the RS-232/USB box with the RS-232 interface of the balance (see table for cable).

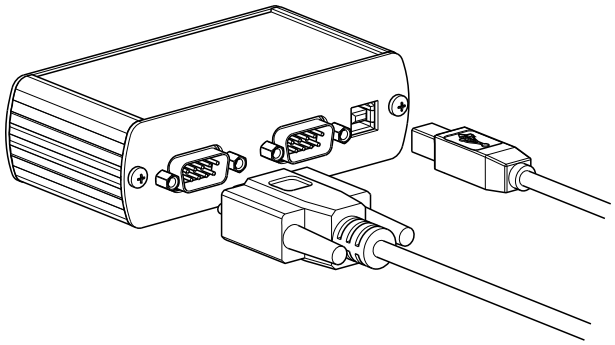


Figure 12 Connecting a balance

3 Switch on the Touch Control.

4 Switch on the balance.

5 Switch on the RS-232 interface of the balance.

6 Configure the RS-232 interface of the RS-232/USB Box in the device manager of the Touch Control as described in the manual for the PC Control / Touch Control.

Operation with PC software

Connect the balance as follows:

1 Connect the RS-232 interface of the computer with the RS-232 interface of the balance (see table for cable).

2 Switch on the balance.

3 Configure the RS-232 interface of the balance.

4 Configure the RS-232 interface of the computer in the device manager of the PC Control software as described in the manual for the PC Control / Touch Control.

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

The PC keyboard is used as an aid for text and numerical input. If you operate the 890 Titrando with the aid of the Touch Control, then you can connect a PC keyboard with USB interface to the Titrando. Currently connectable keyboard models can be found on the Internet under *www.titrando.com*.

Connect the PC keyboard as follows:

1. Insert the USB plug of the keyboard (type A) into one of the USB sockets of the Titrando.

2. Switch on the Touch Control.

   The keyboard will be recognized automatically and entered in the device manager.

3. Configure the keyboard in the device manager of the Touch Control as described in the manual for the PC Control / Touch Control.

3.4.5 Connecting a barcode reader

The barcode reader is used as an aid for text and numerical input. You can connect a barcode reader with USB interface. Currently connectable barcode reader models can be found on the Internet under *www.titrando.com.*

Operation with Touch Control

Connect the barcode reader as follows:

1. Insert the USB plug of the barcode reader (type A) into one of the USB sockets of the Titrando.

2. Switch on the Touch Control.

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

3. Configure the barcode reader in the device manager as described in the manual for the PC Control / Touch Control.

Operation with a PC software

Connect the barcode reader as follows:

1. Insert the USB plug of the barcode reader (type A) into one of the USB sockets of the Titrando or the computer.

2. Start the PC software.

3. Configure the barcode reader in the device manager as described in the manual for the PC Control / Touch Control.

Settings on the barcode reader:

Program the barcode reader as follows (also see manual for the barcode reader).

1. Switch the barcode reader over to programming mode.
2. Specify the desired layout for the keyboard (USA, Germany, France, Spain, German-speaking Switzerland).

   This setting must match the setting in the device manager (see manual for PC Control / Touch Control).
3. Make sure that the barcode reader is set in such a way that **[Ctrl]** characters (ASCII 00 to 31) can be sent.
4. Program the barcode reader in such a way that the ASCII character 02 (STX or **[Ctrl-B]**) is sent as the first character. This first character is normally referred to as the "Preamble" or "Prefix Code".
5. Program the barcode reader in such a way that the ASCII character 04 (EOT or **[Ctrl-D]**) is sent as the last character. This last character is normally referred to as the "Postamble", "Record Suffix" or "Postfix Code".
6. Exit the programming mode.

3.4.6 Connecting a USB hub

If you wish to connect more than two devices to the USB connector of the Titrando, you can also use an additional commercially available USB hub (distributor). If you operate the Titrando with the aid of the Touch Control, then you should use a USB hub with its own power supply.

Connect the USB hub as follows:

1. Switch off the Touch Control and/or close the PC software.
2. With the aid of the 6.2151.020 cable, connect the USB connector of the Titrando (type A) with the USB connector of the hub (type B, see manual for the hub).
3. Switch on the Touch Control, or start PC software respectively.

   The USB hub is recognized automatically.

3.4.7 Connecting a Bluetooth® adapter

Printers and balances (or other devices with RS-232 connection) can be optionally connected using a wireless Bluetooth® connection. Printers and balance models with integrated Bluetooth® functionality are to be recommended for this purpose. Bluetooth® printer adapters for the USB interface can be obtained commercially, as can also Bluetooth® serial adapters for RS-232 connections (e.g. for balances).

Note

Bluetooth® is a registered and copyrighted name of the Bluetooth® Special Interest Group (Bluetooth® SIG, Inc.).

PC Control

If the Titrando system is operated with the PC Control software, then a Bluetooth USB adapter can be connected to one of the USB sockets on the computer (or of the Titrando / USB Sample Processor). The driver software (for MS Windows 2000/XP) included in the scope of delivery by the manufacturer of the Bluetooth adapter must be installed in accordance with the directions contained in the associated manual. 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 RS-232 connections. Printer drivers must be set up prior to the installation of the Bluetooth adapter.

Touch Control

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

Note

The **Metrohm Bluetooth USB adapter** cannot be operated on a computer. The adapter is intended exclusively for use in a Titrando system in stand-alone operation, i.e. with a Touch Control operating unit as controller. The prerequisite is the Touch Control Software version 5.840.0140 or higher.

The Metrohm Bluetooth USB adapter permits wireless data transfer for distances up to 10 m.

Install the Metrohm Bluetooth USB adapter as follows:

1. Plug the Bluetooth adapter into an open USB interface on the rear of the Titrando.

2. Switch on the Touch Control.

   The Bluetooth USB adapter is recognized automatically.

3. Configure the adapter in the device manager of the Touch Control as described in the manual for the PC Control / Touch Control.

Printer and Bluetooth

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

The necessary settings for a Bluetooth-capable printer can be found in the user manual for it. Bluetooth printer adapters can usually be connected without configuration to the USB connector of the respective printer. Comply with the instructions contained in the documentation for the printer adapter. Enter the definition of the printer type in the device manager of the Touch Control.

Balances and Bluetooth

A Bluetooth-capable balance or a Bluetooth serial adapter must comply with the **SPP (Serial Port Profile)** in accordance to Bluetooth specifications. If the balance manufacturer offers a specific Bluetooth serial adapter, then this is to be preferred to a commercially available adapter.

Bluetooth serial adapters must be configured on the PC with the help of an auxiliary program supplied by the manufacturer. The data transfer parameters of the instrument and the adapter must match one another. The Bluetooth serial adapter must be defined as the acceptor and not as the initiator of a serial connection. Authentication with a PIN code is not supported.

3.5 Connecting sensors

3.5.1 General

The measuring interface includes one measuring input (**Pol.**) for a polarizable electrode *(see Figure 3, page 8)*.

3.5.2 Connecting a polarizable electrode

Connect a polarizable electrode as follows:

1 Plug the electrode plug into the **Pol.** socket of the 890 Titrando.

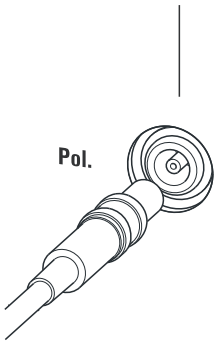


Figure 13 Connecting a polarizable electrode

Note

The electrode cable is protected against accidental disconnection of the cable by means of a pull-out protection feature. If you wish to remove the plug, then you must first retract the outer plug sleeve.

4 Working with the exchange unit

The 806 exchange unit has an integrated data chip which allows to save data for the exchange unit and for the reagent. The data is being edited in the Touch Control or in the PC software. The assembly of the exchange unit is described in the manual for the 806 exchange unit.

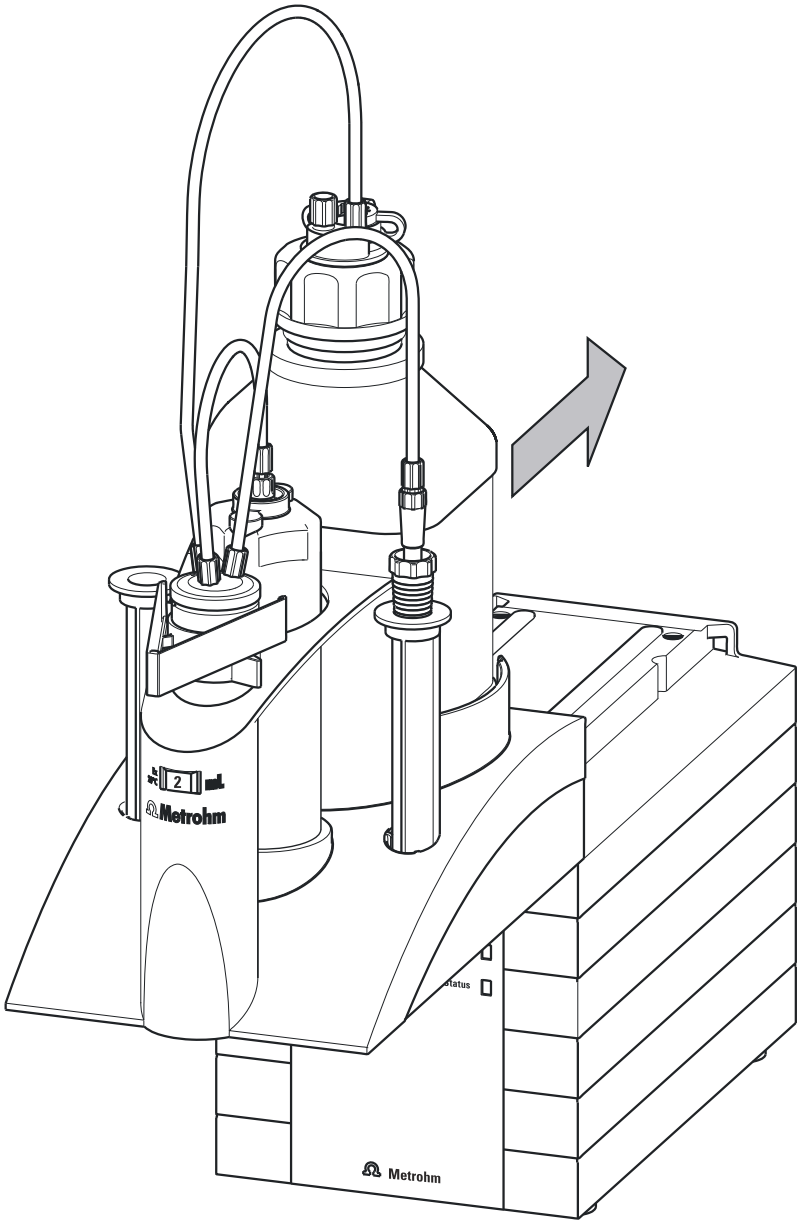


Figure 14 Attaching the exchange unit

To attach the exchange unit, proceed as follows:

1 Slide the exchange unit from the front onto the 890 Titrando and push all the way to the rear, so that it snaps in and the LED **Status** flashes slowly.

It must snap in audibly.

If the exchange unit is attached correctly, its initialization is being activated by a micro switch which is triggered by the guide bolts of the exchange unit. The exchange unit is being recognized and the data is being read automatically from the data chip. After this, the LED **Status** lights up constantly.

The following table provides an overview showing all operating states of the internal dosing device which are indicated with the LED **Status**:

LED **Status**	Operating status of the dosing device
off	No exchange unit is attached.
flashes constantly	The Titrando is ready to dose or titrate. The exchange unit has been attached correctly and recognized and is now in the exchange position, i.e. the exchange unit can be removed.
flashes slowly	The Titrando is dosing or filling or the exchange unit is not in the exchange position, respectively. An 806 intelligent exchange unit has been attached and the data on the integrated data chip is being read or written.
flashes fast	Error at the dosing drive (*see Chap. 5*)

5 Handling and maintenance

5.1 General information

5.1.1 Care

The 890 Titrando requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the service life of the sturdy mechanics and electronics.

Spilled chemicals and solvents must be removed immediately. Above all, the plug connections on the rear of the instrument (in particular the mains connection socket) should be protected from contamination.

Caution

Although this is extensively prevented by design measures, the mains plug should be unplugged immediately if aggressive media has penetrated the inside of the instrument, so as to avoid serious damage to the instrument electronics. In such cases, the Metrohm Service must be informed.

5.1.2 Maintenance by Metrohm Service

Maintenance of the 890 Titrando is best carried out as part of an annual service, which is performed by technicians of the Metrohm company. If working frequently with caustic and corrosive chemicals, a shorter maintenance interval could be necessary.

The Metrohm service department offers every form of technical advice for maintenance and service of all Metrohm instruments.

5.2 Quality Management and validation with Metrohm

Quality Management

Metrohm offers you comprehensive support in implementing quality management measures for instruments and software. Further information on this can be found in the brochure **«Quality Management with Metrohm»** available from your local Metrohm agent.

Validation

Please contact your local Metrohm agent for support in validating instruments and software. Here you can also obtain validation documentation to provide help for carrying out the **Installation Qualification** (IQ) and the **Operational Qualification** (OQ). IQ and OQ are also offered as a service by the Metrohm agents. In addition, various application bulletins are also available on the subject, which also contain **Standard Operating Procedures** (SOP) for testing analytical measuring instruments for reproducibility and correctness.

Maintenance

Electronic and mechanical functional groups in Metrohm instruments can and should be checked as part of regular maintenance by specialist personnel from Metrohm. Please ask your local Metrohm agent regarding the precise terms and conditions involved in concluding a corresponding maintenance agreement.

Note

You can find information on the subjects of quality management, validation and maintenance as well as an overview of the documents currently available at *www.metrohm.com/com/* under **Support**.

6 Troubleshooting

6.1 Problems

Problem	Cause	Remedy
LED "On" is not illuminated although the Titrando is connected to the mains.	*The Touch Control or the computer has not been switched on yet or the plugs are not correctly connected.*	Check the plug connections and switch on the Touch Control or the computer.
LED "Status" is flashing fast.	*The dosing drive is overloaded because the stopcock is jammed.*	Switch off the Touch Control or exit PC Control/tiamo™, respectively. Check whether the exchange unit can be removed. If the exchange unit cannot be removed, check whether the flat stopcock still can be turned. Switch it manually to the exchange position by turning it to the right (see manual for the exchange unit). Remove the exchange unit and proceed as described in the manual for the exchange unit.
	The dosing drive is overloaded because the piston is jammed. This error is being displayed in the software (Touch Control or PC Control / tiamo ™).	Switch the control device off and back on again. The dosing device is being initialized during switching on. Remove the exchange unit and clean it as described in the manual for the exchange unit in chapter "Care and maintenance". Contact the Metrohm service if removing the exchange unit is not possible.
	The data of the exchange unit cannot be read because the data chip has been damaged mechanically or by chemicals.	Have the data chip replaced by the Metrohm service. Until the data chip is being replaced you can remove the data chip yourself in order to be able to still use the exchange unit. The cylinder volume is automatically recognized nevertheless, but no data can be read from the exchange unit or be saved on it anymore.
LED "Status" is not illuminated although an exchange unit is attached.	*The exchange unit has not correctly been attached.*	Remove the exchange unit and attach it again until it snaps in. The LED flashes during data is read out from an intelligent exchange unit (806) and lights up constantly if the exchange unit has correctly been recognized.

Problem	Cause	Remedy
The exchange unit cannot be attached.	*The flat stopcock of the exchange unit is not in the exchange position.*	Switch the flat stopcock manually to the exchange position (switching lever directed to the right).
	The piston rod in the exchange unit is not in the right position.	Switch the piston rod to the right position (see manual for the exchange unit).
The exchange unit cannot be removed and the LED "Status" is flashing slowly.	*It is currently being dosed or filled and/or the Titrando is not in the exchange position.*	Stop the run or carry out a "Filling".

7 Appendix

7.1 Remote interface

The 6.2148.010 remote box allows devices to be controlled which cannot be connected directly to the MSB interface of the Titrando.

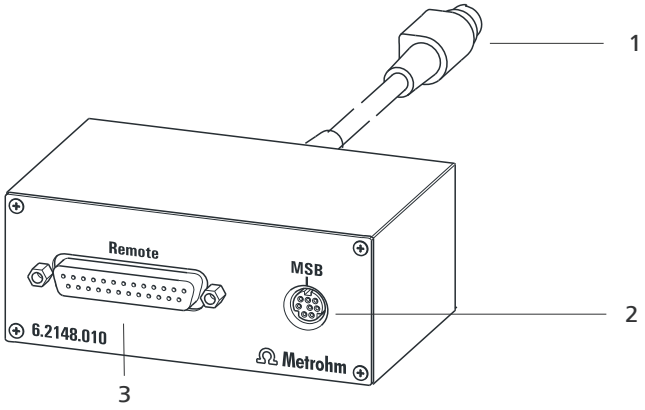


Figure 15 Connectors of the remote box

1 Cable
For connecting the Titrando.

2 MSB connector
Metrohm Serial Bus. For connecting external dosing devices or stirrers.

3 Remote connector
For connecting devices with a remote interface.

7.1.1 Pin assignment of the remote interface

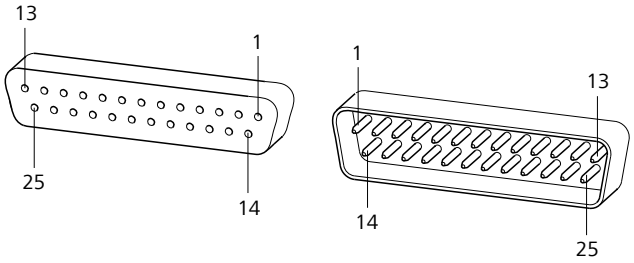
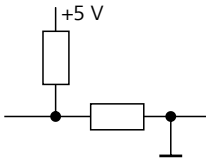


Figure 16 Pin assignment of remote socket and plug

The above presentation of the pin assignment of a Metrohm remote interface applies not only for the remote box, but also for all Metrohm devices with 25-pin D-Sub remote connection.

Inputs

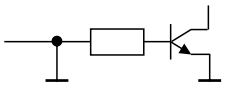


approx. 50 kΩ Pull-up

t_p >20 ms

active = low, inactive = high

Outputs



Open Collector

t_p >200 ms

active = low, inactive = high

I_C = 20 mA, V_{CEO} = 40 V

+5 V: maximum load = 20 mA

The following tables offer information concerning the allocation of the individual pins and their function.

Table 1 Inputs and outputs of the remote interface

Assignment	Pin No.	Function
Input 0	21	**Start**
Input 1	9	**Stop**
Input 2	22	**Quit**
Input 3	10	
Input 4	23	-
Input 5	11	
Input 6	24	
Input 7	12	
Output 0	5	**Ready**
Output 1	18	**Conditioning OK**
Output 2	4	**Determination**
Output 3	17	**EOD**
Output 4	3	
Output 5	16	**Error**
Output 6	1	
Output 7	2	**Warning**

Assignment	Pin No.	Function
Output 8	6	
Output 9	7	
Output 10	8	
Output 11	13	
Output 12	19	
Output 13	20	
0 volts / GND	14	
+5 volts	15	
0 volts / GND	25	

Table 2 Explanation of the individual functions

Function	Explanation
Start	The current method is started at the time of activation. t_{pulse} > 100 ms
Stop	The current method is canceled (Stop) at the time of activation. t_{pulse} > 100 ms
Quit	The current command in the determination run will be canceled at the time of activation. t_{pulse} > 100 ms
Ready	The instrument is ready to receive a start signal.
Conditioning OK	The line is set when Conditioning with SET and KFT titration is at OK. The line remains set until the determination is started with **[START]**.
Determination	The instrument performs a data-generating determination.
EOD	**E**nd **o**f **D**etermination. Pulse (t_{pulse} = 200 ms) after a determination or after a buffer/standard during calibration using a Sample Processor.
Error	The line is set for error message display.

Function	Explanation
Warning	The line is set for warning message display.

8 Technical specifications

8.1 Measuring interface

The 890 Titrando has one measuring input for polarizable electrodes.

The measuring cycle is 100 ms for all measuring modes.

8.1.1 Temperature

One measuring input (**Temp.**) for a Pt1000 or NTC temperature sensor. Automatic temperature compensation for NTC sensors; R (25 °C) and B value can be configured.

Measuring range

Pt1000	–150…+250 °C
NTC	–5…+250 °C (R (25 °C) = 30000 Ω and B (25/50) = 4100 K)

Resolution

Pt1000	0.1 °C
NTC	0.1 °C

Measuring accuracy

Pt1000	±0.2 °C (Applies for measuring range –20…+150 °C; ±1 digit; without sensor error, under reference conditions)
NTC	±0.6 °C (Applies for measuring range +10…+40 °C; ±1 digit; without sensor error, under reference conditions)

8.1.2 Polarizer

A measuring input (**Pol.**) for a polarizable electrode.

Measuring mode Ipol	Determination with adjustable polarization current
Polarization current	–122.5…+122.5 µA (in steps of 0.5 µA) –125.0…+125.0 µA: non-guaranteed values, dependent on reference voltage +2.5 V
Measuring range	–1200…+1200 mV
Resolution	0.1 mV

Measuring accuracy	±0.2 mV (±1 digit, without sensor error, under reference conditions)
Measuring mode Upol	Determination with adjustable polarization voltage
Polarization voltage	–1225…+1225 mV (in steps of 25 mV) –1250…+1250 mV: non-guaranteed values, dependent on reference voltage +2.5 V
Measuring range	–120…+120 µA
Resolution	0.1 µA

8.2 Internal dosing device

Cylinder volume of the exchange unit	1 mL, 5 mL, 10 mL, 20 mL or 50 mL
Resolution	20000 steps per cylinder volume

8.3 Mains connection

Voltage	100…240 V
Frequency	50…60 Hz
Power consumption	maximum 45 W
Fuse	Electronic overload protection

8.4 Safety specifications

Design and testing	▪ EN/IEC 61010-1: 2001 ▪ UL 61010-1: 2004 ▪ CSA-C22.2 No. 61010-1: 2004 ▪ Protection class I
Safety instructions	The documentation contains safety instructions which have to be followed by the user in order to ensure safe operation of the instrument.

8.5 Electromagnetic compatibility (EMC)

Emission

Standards fulfilled:
- EN/IEC 61326-1: 2006
- EN/IEC 61000-6-3: 2005
- EN/IEC 61000-6-4: 2005
- EN 55022 / CISPR 22: 2006

Immunity

Standards fulfilled:
- EN/IEC 61326-1: 2006
- EN/IEC 61000-6-2: 2006
- EN/IEC 61000-4-2: 2001
- EN/IEC 61000-4-3: 2002
- EN/IEC 61000-4-4: 2004
- EN/IEC 61000-4-5: 2001
- EN/IEC 61000-4-6: 2001
- EN/IEC 61000-4-11: 2004
- EN/IEC 61000-4-14: 2004
- NAMUR: 2004

8.6 Ambient temperature

Nominal function range	+5…+45 °C
Storage	–20…+60 °C
Transport	–40…+60 °C

8.7 Reference conditions

Ambient temperature	+25 °C (±3 °C)
Relative humidity	≤ 60 %
Instrument status	Instrument in operation at least 30 min
Validity of the data	After adjustment

8.8 Dimensions

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

8.9 Interfaces

USB connectors

USB ports	2 USB downstream ports (model A sockets), each 500 mA, for connecting peripheral devices such as printers, keyboards, barcode readers or RS-232/USB boxes (Metrohm order no. 6.2148.020).

Controller connector

Controller port	USB upstream port with auxiliary power supply (Mini DIN socket) for connecting Touch Control or computer for controlling the 890 Titrando.
Touch Control	With integrated Touch Control cable
Computer	with cable 6.2151.000

MSB connectors (Metrohm Serial Bus)

Dosing device	Connection for a maximum of 3 external dosing devices, models Dosimat or Dosino (MSB 2 to MSB 4).
Stirrer	Connection for a maximum of 4 stirrers. Stirrer control: switching on/off manually or coordinated with the titration sequence. Rate in 15 steps and shift direction can be selected.
Remote Box	Connection for a maximum of four Remote Boxes. Remote Boxes can be used to actuate and monitor external devices.

9 Conformity and warranty

9.1 Declaration of Conformity

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

890 Titrando

Universal titrator, controlled by a Touch Control or a computer with PC-Software.

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

Electromagnetic compatibility

Emission:	EN/IEC 61326-1: 2006, EN/IEC 61000-6-3: 2004, EN 55022 / CISPR 22: 2006
Immunity:	EN/IEC 61326-1: 2006, EN/IEC 61000-6-2: 2005, EN/IEC 61000-4-2: 2001, EN/IEC 61000-4-3: 2002, EN/IEC 61000-4-4: 2004, EN/IEC 61000-4-5: 2001, EN/IEC 61000-4-6: 2001, EN/IEC 61000-4-11: 2004, EN/IEC 61000-4-14: 2004, NAMUR: 2004

Safety specifications

EN/IEC 61010-1: 2001, UL 61010-1: 2004,
CSA-C22.2 No. 61010-1: 2004, protection class I

CE

This instrument meets the requirements of the CE mark as contained in the EU directives 2006/95/EC (LVD), 2004/108/EC (EMC). It fulfils the following specifications:

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

Manufacturer

Metrohm Ltd., CH-9101 Herisau/Switzerland

Metrohm Ltd. is holder of the SQS certificate ISO 9001:2000 Quality management system for development, production and sales of instruments and accessories for ion analysis.

Herisau, 10 January, 2008

D. Strohm
Vice President, Head of R&D

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

9.2 Quality Management Principles

Metrohm Ltd. holds the ISO 9001:2000 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 9001:2000 quality management 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.

9.3 Warranty (guarantee)

Metrohm guarantees that the deliveries and services it provides are free from material, design or manufacturing errors. The warranty period is 36 months from the day of delivery; for day and night operation it is 18 months. The warranty remains valid on condition that the service is provided by an authorized Metrohm service organization.

Glass breakage is excluded from the warranty for electrodes and other glassware. The warranty for the accuracy corresponds to the technical specifications given in this manual. For components from third parties that make up a considerable part of our instrument, the manufacturer's warranty provisions apply. Warranty claims cannot be pursued if the Customer has not complied with the obligations to make payment on time.

During the warranty period Metrohm undertakes, at its own choice, to either repair at its own premises, free of charge, any instruments that can be shown to be faulty or to replace them. Transport costs are to the Customer's account.

Faults arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc. are expressly excluded from the warranty.

10 Accessories

10.1 Scope of delivery

Note

Subject to change without notice.

10.1.1 890 Titrando with Touch Control 28900110

Qty.	Order no.	Description
1	1.890.0010	**890 Titrando**
1	1.840.0100	**Touch Control** Operating element with touch-sensitive color display for Titrandos. Standard dialog languages English and German. One further language can be retrofitted.
1	1.803.0010	**803 Ti-Stand** Titration stand with magnetic stirrer and built-in pump for solvent addition and aspiration of the titration vessel content.
1	6.0338.100	**Double Pt-wire electrode** Double Pt-wire electrode, Metrohm plug-in head G, for volumetric Karl Fischer titration and 684/737 Coulometer (cell with diaphragm) Measuring range: –2000 ... 2000 Measuring unit: mV Temperature range (°C): –20 ... 70 Shaft length to head (mm): 96 Indicator electrode type : Pt Indicator electrode shape: Wire Plug for filling opening: None Pressure tolerance: > 0

Qty.	Order no.	Description	
1	6.1244.040	**Set of seals**	
1	6.1403.040	**KF adsorber tube** Used with KF equipment. Including cover and O-ring. Height (mm): 113 Outer diameter (mm): 8	
1	6.1414.030	**KF titration vessel lid** For volumetric KF titrations. Material: PTFE Material remark: Insert	
1	6.1415.220	**Titration vessel / 20-90 mL** Material: Clear glass Height (mm): 80 Outer diameter (mm): 78 Volume (mL): 20 ... 90	

Qty.	Order no.	Description	
1	6.1415.250	**Titration vessel / 50-150 mL**	
	Material:	Clear glass	
	Height (mm):	80	
	Outer diameter (mm):	78	
	Volume (mL):	50 ... 150	
2	6.1446.040	**Thread stopper / M6**	
	Material:	PVDF	
	Height (mm):	21.5	
	Outer diameter (mm):	4.9	
1	6.1446.060	**Stopper / B-14/15 / M10**	
	Material:	PP	
	Height (mm):	22	
	SGJ size:	B-14/15	
1	6.1446.090	**Stopper / B-14/15 / M8**	
	Material:	PP	
	Height (mm):	23	
	SGJ size:	B-14/15	

Qty.	Order no.	Description
2	**6.1448.010**	**Septum 12 mm, 5 pieces**

Set of 5 items.

Material: Silicone rubber
Height (mm): 2
Outer diameter (mm): 12

Qty.	Order no.	Description
1	**6.1543.110**	**Aspiration tip / M8 thread**

Used with 676 Sample Changer together with 6.1805.200 tubing and 703 Ti Stand

Material: ETFE/PTFE
Length (mm): 151

Qty.	Order no.	Description
1	**6.1543.120**	**Aspiration tip / M8 thread**

Aspiration tip if 6.1805.200 siphoning tubing is used

Material: ETFE/PTFE
Length (mm): 151

Qty.	Order no.	Description
2	**6.1602.105**	**Bottle neck attachment / GL 45 / green**

For direct dosing from reagent bottles with GL 45 thread.

Material: PFA/PP
Opening ground joint: A-14/15

Qty.	Order no.	Description
1	6.1602.115	**Bottle neck attachment / S 40 / green**

For direct dosing from reagent bottles with S 40 thread (Merck...).

Material:	PFA/PP

Qty.	Order no.	Description
1	6.1608.023	**Amber glass bottle / 1000 mL / GL 45**

For Exchange Units. Bottle for auxiliary solutions.

Material:	Amber glass
Width (mm):	96
Height (mm):	223
Volume (mL):	1000

Qty.	Order no.	Description
1	6.1608.030	**Round glass bottle / 1000 mL / GL 45**

To Exchange Units.

Material:	Clear glass
Height (mm):	223
Volume (mL):	1000

Qty.	Order no.	Description
1	6.1609.010	**Adsorber tube with tubing connection**

Cover with tubing connection.

Height (mm):	155
Inner diameter (mm):	32
SGJ size:	B-14/15

Qty.	Order no.	Description
1	6.1623.000	**Overflow protection for Ti Stand** For 803 Ti Stand

Qty.	Order no.	Description
1	6.1801.120	**PVC tubing / 4 mm / 6 mm / 2 m**

Material: PVC (transparent)
Outer diameter (mm): 6
Inner diameter (mm): 4
Length (m): 2

Qty.	Order no.	Description
2	6.1805.200	**PTFE tubing / M8 / 0.5 m**

Material: PTFE
Outer diameter (mm): 4
Inner diameter (mm): 3
Length (mm): 500

Qty.	Order no.	Description
1	6.1808.050	**Connector tubing nozzle M8**

1 M8 outer thread and 1 tubing olive. E.g. for thermostat jacket of Exchange Units and stability measuring instruments.

Material: PVDF
Length (mm): 31.5

Qty.	Order no.	Description
1	6.1819.030	**Tube**

For M8 threaded holes. For 6.1602.1XX bottle attachments and 6.1608.0XX bottles

Material:	PTFE
Outer diameter (mm):	4
Inner diameter (mm):	3
Length (mm):	250

Qty.	Order no.	Description
1	6.1819.050	**Tube**

For M8 threaded holes of 6.1602.10X bottle attachments with 6.1608.030 aspiration bottle. For 703 and 803 Ti Stand, 681 Pump Unit and 679 Rancimat

Material:	PTFE
Outer diameter (mm):	4
Inner diameter (mm):	3
Length (mm):	88

Qty.	Order no.	Description
2	6.1903.020	**Stirring bar / 16 mm**

Stirring Bar with magnetic core, PTFE coated, length 16 mm

Material:	PTFE
Outer diameter (mm):	4
Length (mm):	16

Qty.	Order no.	Description
2	6.1903.030	**Stirring bar / 25 mm**

Stirring Bar with magnetic core, PTFE coated, length 25 mm

Material:	PTFE
Outer diameter (mm):	5
Length (mm):	25

Qty.	Order no.	Description
1	6.2001.060	**Base-plate without support rod**

For mounting stirrers.

Qty.	Order no.	Description
1	6.2013.010	**Clamping ring**

For stand rods of 10 mm diameter

Material:	Metal
Width (mm):	20
Height (mm):	16

Qty.	Order no.	Description
1	6.2016.070	**Support rod / 400 mm**

Material:	Stainless steel 18/9
Outer diameter (mm):	10
Length (mm):	400

Qty.	Order no.	Description	
1	6.2023.020	**Clip for SGJ 14/15** Clip for SGJ 14/16 Material: POM	
2	6.2043.005	**Holding clip for bottles** Holding clip for reagent bottle of Exchange Units	
1	6.2104.020	**Electrode cable / 1 m / F** For connecting electrodes with Metrohm plug-in head G to Metrohm instruments (socket F). Length (m): 1	
1	6.2412.000	**Glass weighing spoon** Used with 6.1414.030 Titration vessel lid or 6.1455.31X, 6.1464.32X, 6.1465.320 Titration vessels. For Karl Fischer water determinations. Including protective tube. Material: Glass Length (mm): 120	
1	6.2621.070	**Hexagon key 5 mm** 5 mm. Length (mm): 80	

Qty.	Order no.	Description
1	6.2621.130	**Hexagon key 2 mm** 2 mm

Qty.	Order no.	Description
2	6.2730.010	**Screw nipple** Made of PP. Together with 6.1448.010 Septum or for mounting 6.1403.040 Adsorber tube or 6.0338.100 Electrode in 6.1414.030 and 6.1414.040 KF Titration vessel lids. Used for KF titrations. Material: PP Inner diameter (mm): 11.5 Length (mm): 23.5

Qty.	Order no.	Description
1	6.2730.020	**Septum stopper** With E.301.0041 O-ring. For 6.1448.010 Septum and 6.1414.030 Titration vessel lid. Used for KF applications. Outer diameter (mm): 18 Length (mm): 30

Qty.	Order no.	Description
3	6.2730.030	**Stopper** Nipple and E.301.0043 O-ring included. For 6.1414.030 titration vessel lid. Used with KF Titrators, VA Stands, VA Computrace and 838 Advanced IC Dilution Sample Processor Length (mm): 38

Qty.	Order no.	Description	
1	6.2739.000	**Wrench** For tightening connectors Length (mm): 68	
1	6.2811.000	**Molecular sieve** Molecular sieve. Bottle containing 250 g. Pore size: 0.3 nm. Without moisture indicator. For Rancimats and Karl Fischer instructions.	
1	6.3026.210	**Exchange unit / 10 mL** Exchange unit with integrated data chip with 10 mL glass cylinder and light protection. PCTFE/PTFE flat stopcock, FEP tubing connection, antidiffusion buret tip and standard amber glass reagent bottle. Volume (mL): 10	
1	6.6051.000	**CompactFlash card with Titrando methods** Memory card with application methods	
1	6.2122.0x0	**Mains cable with C13 line socket IEC-60320-C13** Cable plug according to customer requirements. Switzerland: Type SEV 12 6.2122.020 Germany, …: Type CEE(7), VII 6.2122.040 USA, …: Type NEMA/ASA 6.2122.070	

Qty.	Order no.	Description
1	8.890.8002EN	890 Titrando Manual

10.1.2 890 Titrando with tiamo light 28900210

Qty.	Order no.	Description
1	1.890.0010	890 Titrando
1	1.803.0010	803 Ti-Stand Titration stand with magnetic stirrer and built-in pump for solvent addition and aspiration of the titration vessel content.
1	6.0338.100	Double Pt-wire electrode Double Pt-wire electrode, Metrohm plug-in head G, for volumetric Karl Fischer titration and 684/737 Coulometer (cell with diaphragm) Measuring range: –2000 ... 2000 Measuring unit: mV Temperature rang (°C): –20 ... 70 Shaft length to head (mm): 96 Indicator electrode type : Pt Indicator electrode shape: Wire Plug for filling opening: None Pressure tolerance: > 0
1	6.1244.040	Set of seals

Qty.	Order no.	Description
1	6.1403.040	**KF adsorber tube**

Used with KF equipment. Including cover and O-ring.

Height (mm):	113
Outer diameter (mm):	8

Qty.	Order no.	Description
1	6.1414.030	**KF titration vessel lid**

For volumetric KF titrations.

Material:	PTFE
Material remark:	Insert

Qty.	Order no.	Description
1	6.1415.220	**Titration vessel / 20-90 mL**

Material:	Clear glass
Height (mm):	80
Outer diameter (mm):	78
Volume (mL):	20 ... 90

Qty.	Order no.	Description
1	6.1415.250	**Titration vessel / 50-150 mL**

Material:	Clear glass
Height (mm):	80
Outer diameter (mm):	78
Volume (mL):	50 ... 150

Qty.	Order no.	Description	
2	6.1446.040	**Thread stopper / M6**	
	Material:	PVDF	
	Height (mm):	21.5	
	Outer diameter (mm):	4.9	
1	6.1446.060	**Stopper / B-14/15 / M10**	
	Material:	PP	
	Height (mm):	22	
	SGJ size:	B-14/15	
1	6.1446.090	**Stopper / B-14/15 / M8**	
	Material:	PP	
	Height (mm):	23	
	SGJ size:	B-14/15	
2	6.1448.010	**Septum 12 mm, 5 pieces**	
	Set of 5 items.		
	Material:	Silicone rubber	
	Height (mm):	2	
	Outer diameter (mm):	12	

Qty.	Order no.	Description
1	6.1543.110	**Aspiration tip / M8 thread**

Used with 676 Sample Changer together with 6.1805.200 tubing and 703 Ti Stand

Material: ETFE/PTFE
Length (mm): 151

Qty.	Order no.	Description
1	6.1543.120	**Aspiration tip / M8 thread**

Aspiration tip if 6.1805.200 siphoning tubing is used

Material: ETFE/PTFE
Length (mm): 151

Qty.	Order no.	Description
2	6.1602.105	**Bottle neck attachment / GL 45 / green**

For direct dosing from reagent bottles with GL 45 thread.

Material: PFA/PP
Opening ground joint: A-14/15

Qty.	Order no.	Description
1	6.1602.115	**Bottle neck attachment / S 40 / green**

For direct dosing from reagent bottles with S 40 thread (Merck...).

Material: PFA/PP

Qty.	Order no.	Description
1	6.1608.023	**Amber glass bottle / 1000 mL / GL 45**

For Exchange Units. Bottle for auxiliary solutions.

Material:	Amber glass
Width (mm):	96
Height (mm):	223
Volume (mL):	1000

Qty.	Order no.	Description
1	6.1608.030	**Round glass bottle / 1000 mL / GL 45**

To Exchange Units.

Material:	Clear glass
Height (mm):	223
Volume (mL):	1000

Qty.	Order no.	Description
1	6.1609.010	**Adsorber tube with tubing connection**

Cover with tubing connection.

Height (mm):	155
Inner diameter (mm):	32
SGJ size:	B-14/15

Qty.	Order no.	Description
1	6.1623.000	**Overflow protection for Ti Stand** For 803 Ti Stand

Qty.	Order no.	Description
1	6.1801.120	**PVC tubing / 4 mm / 6 mm / 2 m** Material: PVC (transparent) Outer diameter (mm): 6 Inner diameter (mm): 4 Length (m): 2

Qty.	Order no.	Description
2	6.1805.200	**PTFE tubing / M8 / 0.5 m** Material: PTFE Outer diameter (mm): 4 Inner diameter (mm): 3 Length (mm): 500

Qty.	Order no.	Description
1	6.1808.050	**Connector tubing nozzle M8** 1 M8 outer thread and 1 tubing olive. E.g. for thermostat jacket of Exchange Units and stability measuring instruments. Material: PVDF Length (mm): 31.5

Qty.	Order no.	Description
1	6.1819.030	**Tube**

For M8 threaded holes. For 6.1602.1XX bottle attachments and 6.1608.0XX bottles

Material:	PTFE
Outer diameter (mm):	4
Inner diameter (mm):	3
Length (mm):	250

1	6.1819.050	**Tube**

For M8 threaded holes of 6.1602.10X bottle attachments with 6.1608.030 aspiration bottle. For 703 and 803 Ti Stand, 681 Pump Unit and 679 Rancimat

Material:	PTFE
Outer diameter (mm):	4
Inner diameter (mm):	3
Length (mm):	88

2	6.1903.020	**Stirring bar / 16 mm**

Stirring Bar with magnetic core, PTFE coated, length 16 mm

Material:	PTFE
Outer diameter (inches):	4
Length (mm):	16

Qty.	Order no.	Description
2	6.1903.030	**Stirring bar / 25 mm**

Stirring Bar with magnetic core, PTFE coated, length 25 mm

Material:	PTFE
Outer diameter (mm):	5
Length (mm):	25

Qty.	Order no.	Description
1	6.2001.060	**Base-plate without support rod**

For mounting stirrers.

Qty.	Order no.	Description
1	6.2013.010	**Clamping ring**

For stand rods of 10 mm diameter

Material:	Metal
Width (mm):	20
Height (mm):	16

Qty.	Order no.	Description
1	6.2016.070	**Support rod / 400 mm**

Material:	Stainless steel 18/9
Outer diameter (mm):	10
Length (mm):	400

Qty.	Order no.	Description	
1	6.2023.020	**Clip for SGJ 14/15** Clip for SGJ 14/16 Material: POM	
2	6.2043.005	**Holding clip for bottles** Holding clip for reagent bottle of Exchange Units	
1	6.2104.020	**Electrode cable / 1 m / F** For connecting electrodes with Metrohm plug-in head G to Metrohm instruments (socket F). Length (m): 1	
1	6.2151.000	**Cable USB A - mini-DIN 8P** Cable connecting a Titrando, USB Sample Processors, Dosing Interface, Robotic Titrosampler to a PC (USB connection, type A) and for connecting further Titrandos. USB A - Controller. Length (m): 1.8	
1	6.2412.000	**Glass weighing spoon** Used with 6.1414.030 Titration vessel lid or 6.1455.31X, 6.1464.32X, 6.1465.320 Titration vessels. For Karl Fischer water determinations. Including protective tube. Material: Glass Length (mm): 120	

Qty.	Order no.	Description
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1	6.2811.000	**Molecular sieve** Molecular sieve. Bottle containing 250 g. Pore size: 0.3 nm. Without moisture indicator. For Rancimats and Karl Fischer instructions.	
1	6.3026.210	**Exchange unit / 10 mL** Exchange unit with integrated data chip with 10 mL glass cylinder and light protection. PCTFE/PTFE flat stopcock, FEP tubing connection, antidiffusion buret tip and standard amber glass reagent bottle. Volume (mL): 10	
1	6.6056.131	**tiamo light CD: 1 Lizenz** tiamo light with additional drivers for the 888 and 890 Titrando, the 856 Conductivity Module and the 867 pH Module.	

Qty.	Order no.	Description
1	**6.2122.0x0**	**Mains cable with C13 line socket IEC-60320-C13**
		Cable plug according to customer requirements.
		Switzerland: Type SEV 12 6.2122.020
		Germany, …: Type CEE(7), VII 6.2122.040
		USA, …: Type NEMA/ASA 6.2122.070
1	**8.890.8002EN**	**890 Titrando Manual**

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