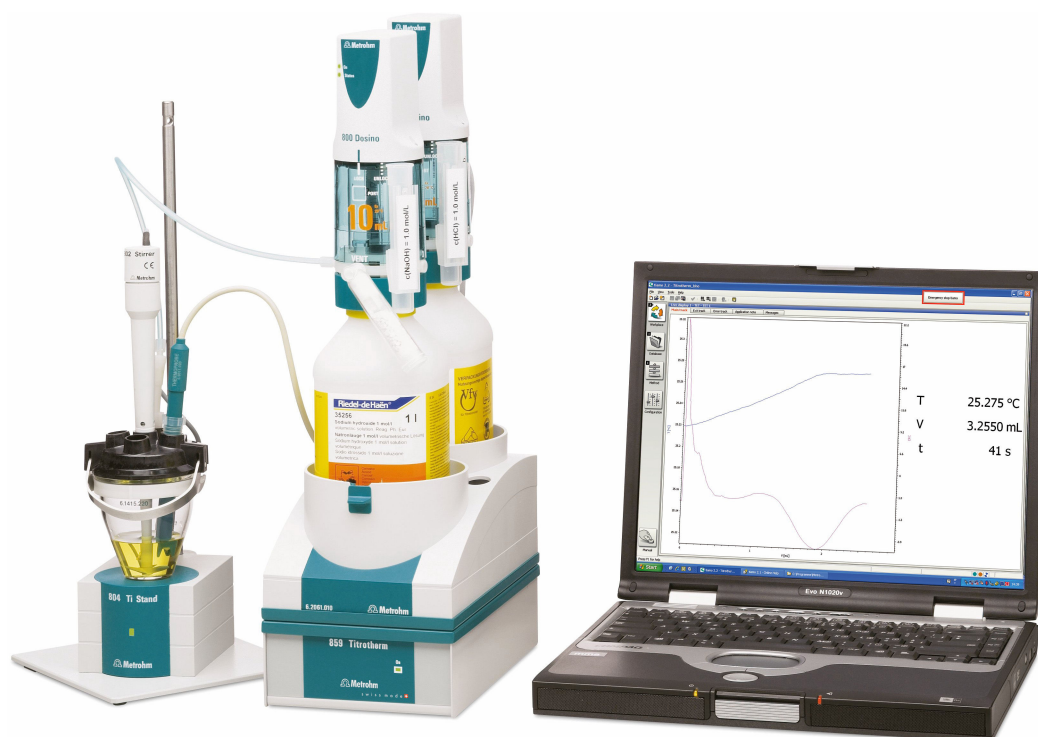


859 Titrotherm



Manual

8.859.8001EN / 2019-12-02



Metrohm AG

CH-9100 Herisau

Switzerland

Phone +41 71 353 85 85

Fax +41 71 353 89 01

info@metrohm.com

www.metrohm.com

859 Titrotherm

Manual

Technical Communication
Metrohm AG
CH-9100 Herisau
techcom@metrohm.com

This documentation is protected by copyright. All rights reserved.

This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

Table of contents

1	Introduction	1
1.1	The 859 Titrotherm in the Titrand system	1
1.2	Instrument description	3
1.2.1	Titration modes, dosing commands and other commands	3
1.2.2	Intended use	3
1.3	About the documentation	4
1.3.1	Symbols and conventions	4
1.4	Safety instructions	5
1.4.1	General notes on safety	5
1.4.2	Electrical safety	5
1.4.3	Working with liquids	6
1.4.4	Recycling and disposal	6
2	Overview of the instrument	7
3	Installation	9
3.1	Setting up the instrument	9
3.1.1	Packaging	9
3.1.2	Checks	9
3.1.3	Location	9
3.2	Connecting the instrument to the power grid	9
3.3	Connecting a computer	10
3.4	Connecting MSB devices	12
3.4.1	Connecting a dosing device	14
3.4.2	Connecting a stirrer or titration stand	14
3.4.3	Connecting a Remote Box	15
3.5	Connecting USB devices	16
3.6	Connecting a sensor	17
3.7	Setting up the titration cell	18
4	Handling and maintenance	20
4.1	Care	20
4.2	Maintenance by Metrohm Service	20
5	Troubleshooting	21
5.1	Problems	21



6	Appendix	22
6.1	Thermoprobes	22
6.1.1	Various models	22
6.1.2	Cleaning and storage	22
6.2	Maximum dosing and filling rate	23
6.3	Remote interface	24
6.3.1	Pin assignment of the remote interfaces	24
7	Technical specifications	26
7.1	Measuring interface NTC 10 kOhm	26
7.2	Interfaces and connectors	26
7.3	Mains connection	26
7.4	Ambient temperature	27
7.5	Reference conditions	27
7.6	Dimensions	27
8	Accessories	28
	Index	29

Table of figures

Figure 1	The 859 Titrotherm in the Titrand system	2
Figure 2	Front 859 Titrotherm	7
Figure 3	Rear 859 Titrotherm	7
Figure 4	859 Titrotherm with titration accessories	8
Figure 5	Connecting the computer	11
Figure 6	MSB connections	13
Figure 7	Connecting a dosing device	14
Figure 8	Connecting an MSB stirrer	15
Figure 9	Propeller stirrer and titration stand	15
Figure 10	Connecting a Remote Box	16
Figure 11	Connecting USB devices to the 859 Titrotherm	17
Figure 12	Positioning the Thermoprobe	19
Figure 13	Thermoprobes – two models	22
Figure 14	Connectors of the Remote Box	24
Figure 15	Pin assignment of remote socket and remote plug	24

1 Introduction

The 859 Titrotherm is a Metrohm titrator for thermometric titration. Thermometric titration can be utilized where potentiometric indication is either not possible or possible only to a limited extent.

For the theory and application possibilities of thermometric titration, we recommend the monograph: Thomas Smith, *Practical thermometric titrimetry*, Metrohm AG, **2006** (Order No. 8.036.5003).

1.1 The 859 Titrotherm in the Titrando system

The 859 Titrotherm is a component of the modular Titrando system. Operation is carried out with a computer containing the software **tiamo™** (starting with Version 2.2).

A Titrando system can contain numerous, various kinds of instruments. The following figure provides an overview of the peripheral devices you can connect to the 859 Titrotherm.

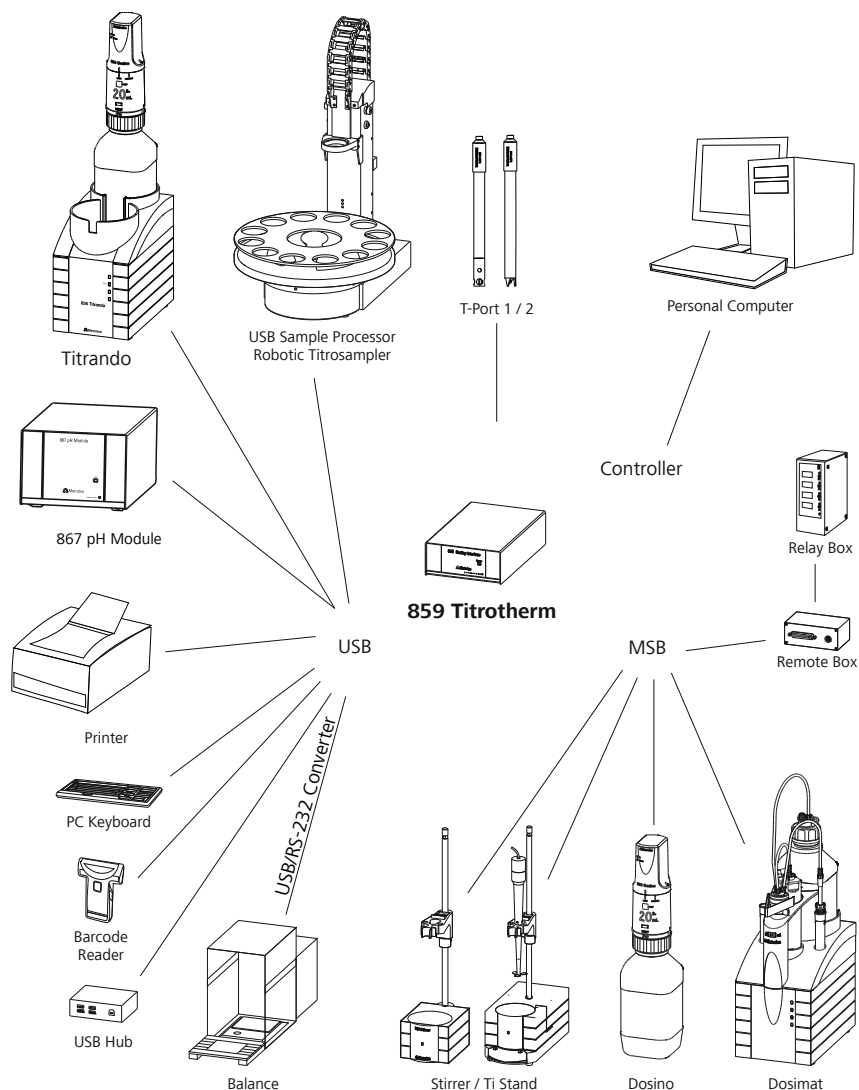


Figure 1 The 859 Titrotherm in the Titrando system

You can request information on special applications in the "Application Bulletins" and "Application Notes"; available free of charge via the Metrohm representative responsible.

Updating the device software is described in the tiamo help.

1.2 Instrument description

The 859 Titrotherm has the following characteristics:

- **Operation**
Operation is carried out using the high-performance PC software **tiamo™**, Version 2.2 or higher.
- **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 (USB Sample Processor, Titrando, Dosing Interface, etc.) can be connected.
- **Measuring interface**
Measuring interface with two connectors for two temperature sensors (Thermoprobes).

1.2.1 Titration modes, dosing commands and other commands

- **TET**
Thermometric endpoint titration. The reagent addition takes place continuously at a constant dosing rate.
- **Dosing commands**
The following commands for dosing can be selected:
 - **ADD** (adding a predefined volume)
 - **PREP** (rinsing the cylinder and tubings of an exchange or dosing unit)
 - **EMPTY** (for emptying cylinder and tubings)
 - **LQH** (for executing complex dosing tasks)
- **Other commands**
 - **STIR** (stirrer control)
 - **SCAN** (scanning remote signals)
 - **CTRL** (setting remote signals)

1.2.2 Intended use

The 859 Titrotherm is designed for usage as a titrator in analytical laboratories. Its main area of application is the determination of ions in aqueous and nonaqueous media. The 859 Titrotherm uses the method of thermometric titration.

This instrument is suitable for processing chemicals and flammable samples. The usage of the 859 Titrotherm therefore requires that the user has basic knowledge and experience in the handling of toxic and caustic sub-



stances. Knowledge with respect to the application of the fire prevention measures prescribed for laboratories is also mandatory.

1.3 About the documentation



CAUTION

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

1.3.1 Symbols and conventions

The following symbols and formatting may appear 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.
Method	Dialog text, parameter in the software
File ▶ New	Menu or menu item
[Next]	Button or key
	WARNING This symbol draws attention to a possible life-threatening 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 possible damage to instruments or instrument parts.

**NOTE**

This symbol highlights additional information and tips.

1.4 Safety instructions

1.4.1 General notes on safety

**WARNING**

Operate this instrument only according to the information contained in this documentation.

This instrument 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.

1.4.2 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.



Supply voltage



WARNING

An incorrect supply voltage can damage the instrument.

Only operate this instrument with a supply 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.

Do not fail to pull the power cord out of the power socket before you set up or disconnect electrical plug connections at the rear of the instrument.

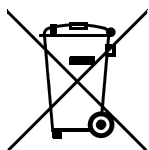
1.4.3 Working with liquids



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.

1.4.4 Recycling and disposal



This product is covered by European Directive 2012/19/EU, WEEE – Waste Electrical and Electronic Equipment.

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

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

2 Overview of the instrument

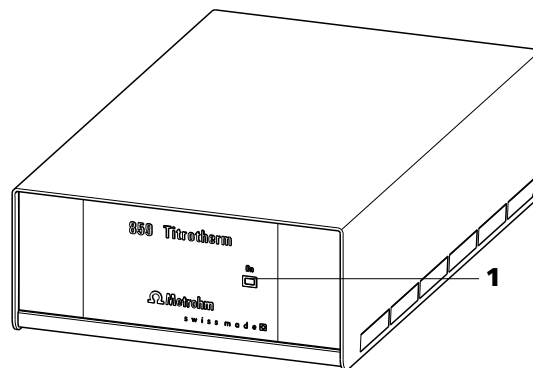


Figure 2 Front 859 Titrotherm

1 LED "On"

Lights up when the device and a computer are connected to the mains and switched on.

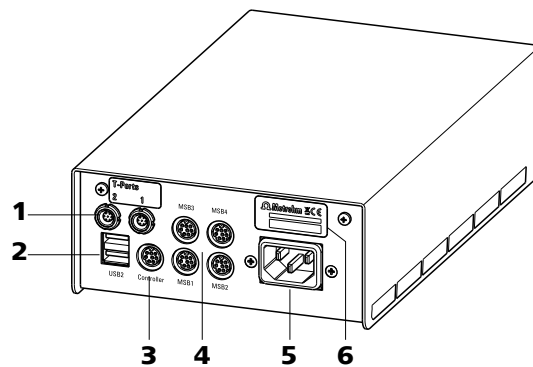


Figure 3 Rear 859 Titrotherm

1 Measuring interface: T-Port 1 and 2
For connecting two Thermoprobes.

3 Controller connector (Controller)
Connector for a PC with installed PC software. Mini DIN, 9-pin.

5 Mains connection socket

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

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

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

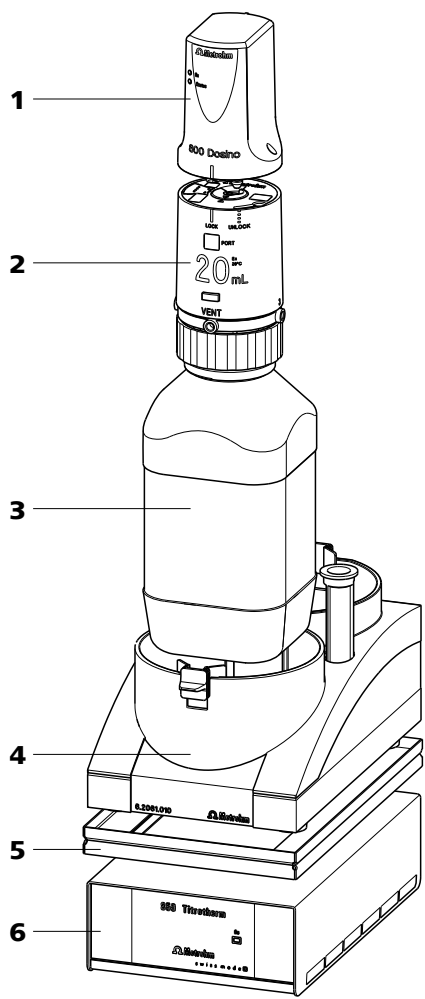


Figure 4 859 Titrotherm with titration accessories

1 800 Dosino Dosing drive for the titrant.	2 Dosing unit (6.3032.XXX) With cylinder sizes 2, 5, 10, 20, 50 mL.
3 Bottle (6.1608.XXX)	4 Bottle holder for Dosinos (6.2061.010)
5 Stacking frame (6.2065.000)	6 859 Titrotherm

3 Installation

3.1 Setting up the instrument

3.1.1 Packaging

The instrument is supplied in protective 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 and free of vibrations and which provides protection against corrosive atmosphere and contamination by chemicals.

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

3.2 Connecting the instrument to the power grid



WARNING

Electric shock from electrical potential

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the instrument while the power cord is still connected.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- Unplug the power plug immediately if you suspect that moisture has gotten inside the instrument.
- Only personnel who have been issued Metrohm qualifications may perform service and repair work on electrical and electronic parts.



Connecting the power cord

Accessories

Power cord with the following specifications:

- Length: max. 2 m
- Number of cores: 3, with protective conductor
- Instrument plug: IEC 60320 type C13
- Conductor cross-section 3x min. 0.75 mm² / 18 AWG
- Power plug:
 - according to customer requirement (6.2122.XX0)
 - min. 10 A



NOTICE

Do not use a not permitted power cord!

1 Plugging in the power cord

- Plug the power cord into the instrument's power socket.
- Connect the power cord to the power grid.

3.3 Connecting a computer

The 859 Titrotherm requires a USB connection to a computer in order to be able to be controlled by a computer software. Using a 6.2151.000 controller cable, 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.

You need administrator rights for the installation of driver software and control software on your computer.

Cable connection and driver installation

A driver installation is required in order to ensure that the 859 Titrotherm is recognized by the computer software. To accomplish this, you must comply with the procedures specified. The following steps are necessary:

1 Installing the software

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

2 Establishing the cable connections

- Connect the instrument to the power supply if you have not already done this.
The "On" LED on the 859 Titrotherm 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.

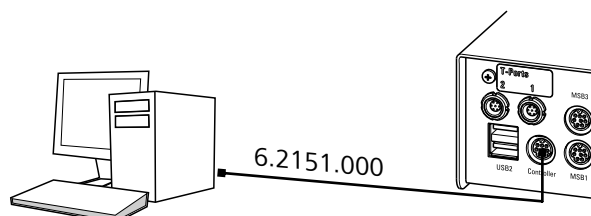


Figure 5 Connecting the computer

The instrument is recognized. Depending on the version of the Windows operating system used, the driver installation proceeds differently afterwards. Either the necessary driver software is installed automatically or an installation wizard is started.

3 Follow the instructions of the installation wizard.

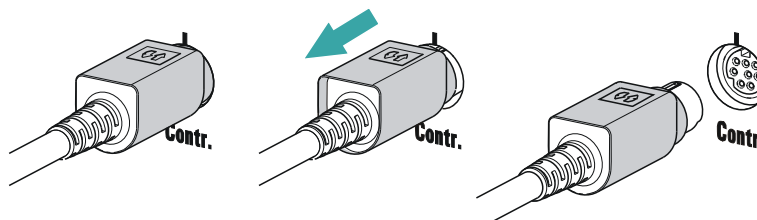
The "On" LED on the 859 Titrotherm lights up when the driver installation has been completed and the instrument is ready for operation.

If problems should occur during installation, contact your company's IT support team.



NOTICE

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 first need to pull back the outer plug sleeve marked with arrows.





Registering and configuring the instrument in the computer software

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

1 Setting up the instrument

- Start the computer software.
The instrument is automatically recognized. 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 computer software.

3.4 Connecting MSB devices

In order to connect MSB devices, e.g. stirrers or dosing devices, Metrohm instruments are equipped with up to four connectors on 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 device. In addition to the connection cable, stirrers and the Remote Box are each equipped with their own MSB socket for this purpose.

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

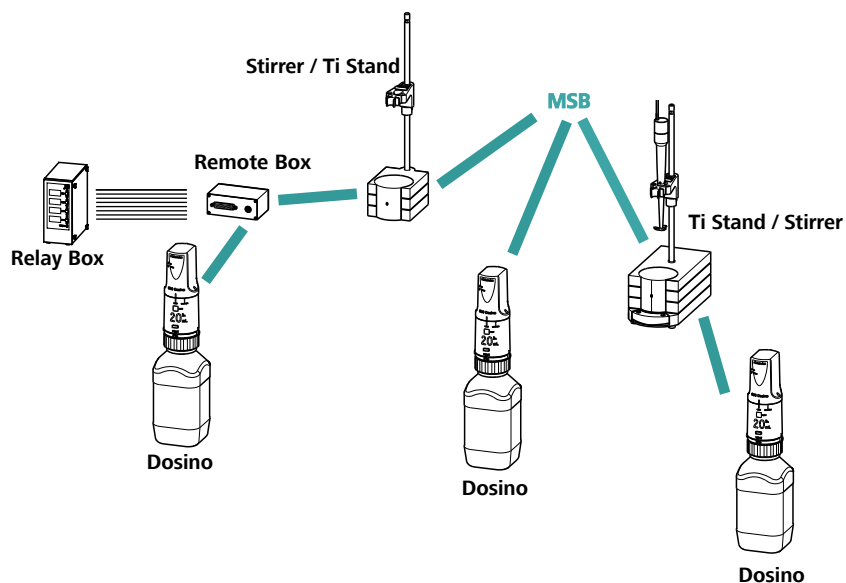


Figure 6 MSB connections

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



NOTICE

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 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. When the control device is switched on, it automatically recognizes which instrument is connected at which MSB connector. 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 maximum connection length permitted is 15 m.



3.4.1 Connecting a dosing device

Four dosing devices can be connected to the instrument (**MSB 1 to MSB 4**).

The types of dosing devices that are supported are:

- 700 Dosino
- 800 Dosino
- 805 Dosimat

Proceed as follows:

1 Connect the dosing device

- Exit the control software.
- Connect the connection cable to one of the sockets marked with **MSB** on the rear of the 859 Titrotherm.
- Start the control software.

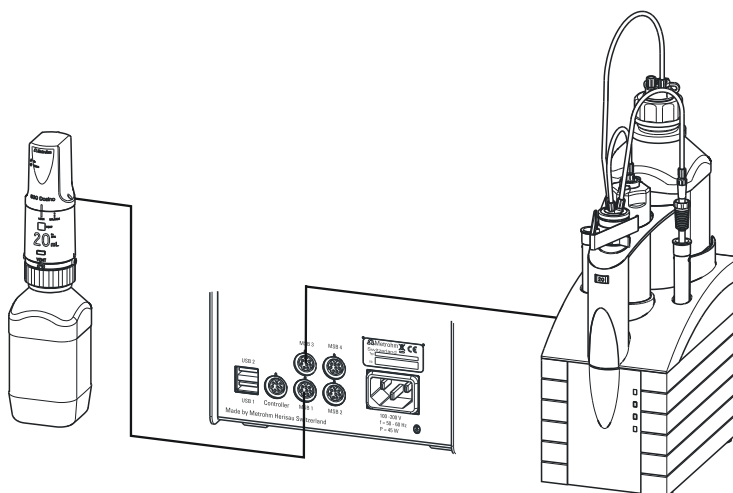


Figure 7 Connecting a dosing device

3.4.2 Connecting a stirrer or titration stand

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

Connect a stirrer or a titration stand as follows:

1 Connect the 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 859 Titrotherm.

- If desired, connect the propeller stirrer to the stirrer socket (with stirrer symbol) of the titration stand.
- Start the control software.

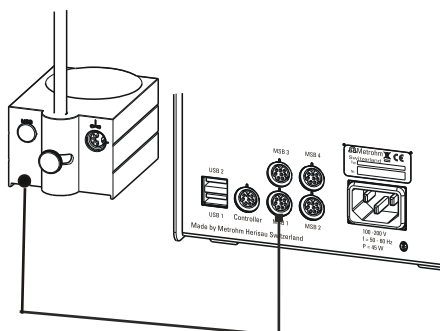


Figure 8 Connecting an MSB stirrer

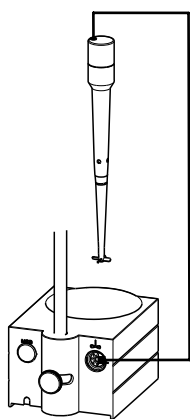


Figure 9 Propeller stirrer and titration stand

3.4.3 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 electrical pulses (> 200 ms) which display the operating status 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 the 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 device.
- Start the control software.

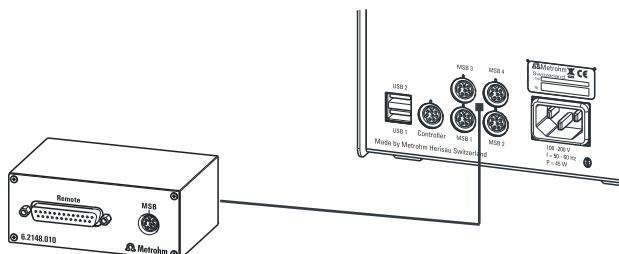


Figure 10 Connecting a Remote Box

You can, for example, connect an 849 Level Control (fill level monitoring in a 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 device, 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 the Appendix (*see chapter 6.3, page 24*).

3.5 Connecting USB devices

Additional Metrohm devices, such as USB Sample Processors, Dosing Interfaces, Titrandos, etc. can be connected to the 859 Titrotherm.

Proceed as follows:

- 1 Connect one 6.2151.000 connecting cable with one end (8-pin Mini DIN plug) to the **Controller** connector of the Metrohm device.
- 2 Connect the other end of the connecting cable to the connector **USB1** or **USB2** of the 859 Titrotherm.

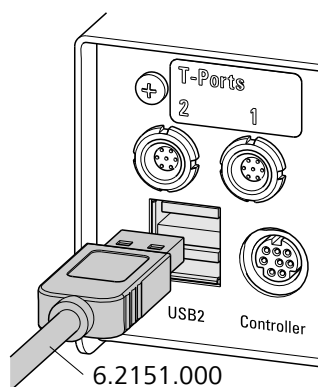


Figure 11 Connecting USB devices to the 859 Titrotherm

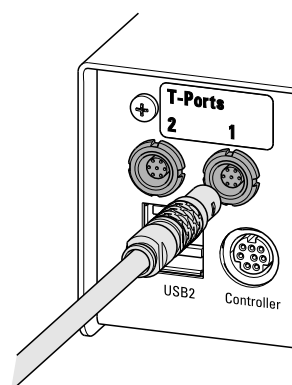
This way, several Metrohm devices can be connected with one another and be controlled simultaneously from one PC software.

3.6 Connecting a sensor

Connect the Thermoprobe as follows:

- 1 Plug the Thermoprobe plug into the **T-Port 1** or **T-Port 2** socket of the 859 Titrotherm.

Note the orientation of the plug.



Connecting a Thermoprobe

In order to disconnect the sensor, the outer plug sleeve on the plug must first be retracted.



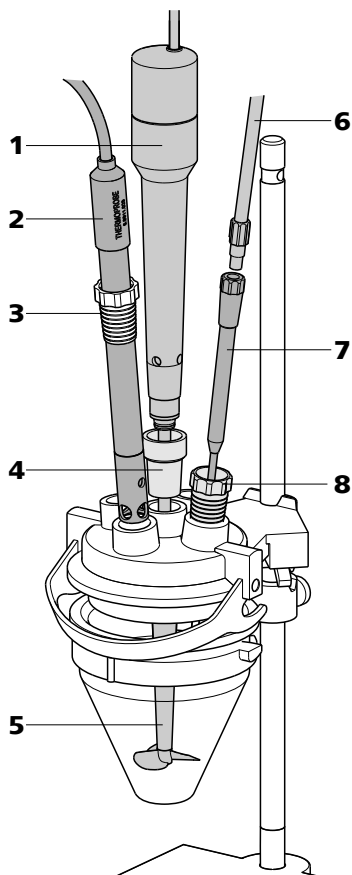
NOTICE

Never use the cable to pull out the sensor!



3.7 Setting up the titration cell

Install the titration cell in accordance with the following figure:



1 Propeller stirrer (802 Stirrer)

Connect the stirrer to the stirrer connector on the rear of the titration stand.

3 SGJ sleeve (6.1236.050)

SGJ 14/12 mm Material: PE.

5 Stirring propeller (6.1909.010)

L= 96 mm, Material: PP.

7 Antidiffusion tip M6 (6.1543.200)

L=151 mm, Material: ETFE/FEP.

2 Sensor Thermoprobe (6.9011.020 or 6.9011.040)

Connect the sensor at **T-Port 1** (or T-Port 2) to the rear side of the 859 Titrotherm.

4 SGJ intermediate cone (6.2727.010)

For the 802 Stirrer.

6 FEP tubing (6.1805.100)

Connect the tubing (40 cm) to Port 1 on the dosing unit.

8 Link stopper (6.1446.030)

Material: ETFE.

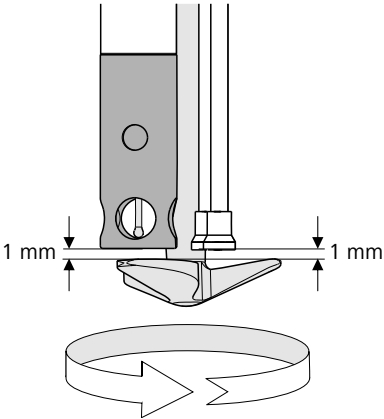


Figure 12 Positioning the Thermoprobe

The sensor should be installed in accordance with the above figure. A high stirring rate is very important. Please ensure that there is a sufficient amount of liquid in the vessel so that the sensor is immersed at least 1 cm, even when the solution is being stirred at high speed. A visible vortex must result.



4 Handling and maintenance

4.1 Care

The 859 Titrotherm requires appropriate care. Excess contamination of the instrument may result in functional disruptions and a reduction in the life-time of the sturdy mechanics and electronics.

Spilled chemicals and solvents should 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.

4.2 Maintenance by Metrohm Service

Maintenance of the 859 Titrotherm is best carried out as part of an annual service performed by specialist personnel 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 Troubleshooting

5.1 Problems

Problem	Cause	Remedy
The "On" LED is not illuminated, even though the instrument is connected to the power supply.	<i>The computer has not been switched on yet or the plugs are not correctly plugged in.</i>	Check the plug connections and switch on the computer.
The "Status" LED flashes rapidly.	<i>The data of the dosing unit cannot be read because the data chip has been damaged mechanically or by chemicals.</i>	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 dosing unit. The cylinder volume is automatically recognized nevertheless, but no data can be read from the dosing unit or be saved on it anymore.
	<i>The dosing drive is overloaded because the piston or the valve disc is jammed.</i>	<p>Exit tiamo™ and then restart it. The dosing device will be initialized at this time. If the error is not rectified by these actions, attempt to remove the dosing drive.</p> <p>If this is not possible, proceed as follows:</p> <ol style="list-style-type: none"> 1. Exit tiamo™. 2. Press the locking button of the dosing unit and remove the distributor. Turn it upside down in its entirety. 3. Start tiamo™ and initiate 'Filling' in the manual control. If the rotation of the stopcock is clearly audible, then the dosing unit, with Dosino attached, can be reattached to the distributor. 4. Place the dosing unit with Dosino attached upright on the distributor, align marking rib to marking rib, and rotate the dosing unit to the left until the spring clip snaps audibly into place. Now you should be able to remove the Dosino from the dosing unit.



6 Appendix

6.1 Thermoprobes

6.1.1 Various models

The sensors for the 859 Titrotherm are called Thermoprobes. A Thermoprobe is a temperature sensor that is based on semiconductor technology (thermistor). It has a short response time of 0.3 s and a high resolution of 10^{-5} K. This enables the precise recording of even the smallest of temperature changes that occur during a titration.

In contrast to potentiometric electrodes, Thermoprobes need **not** be calibrated!

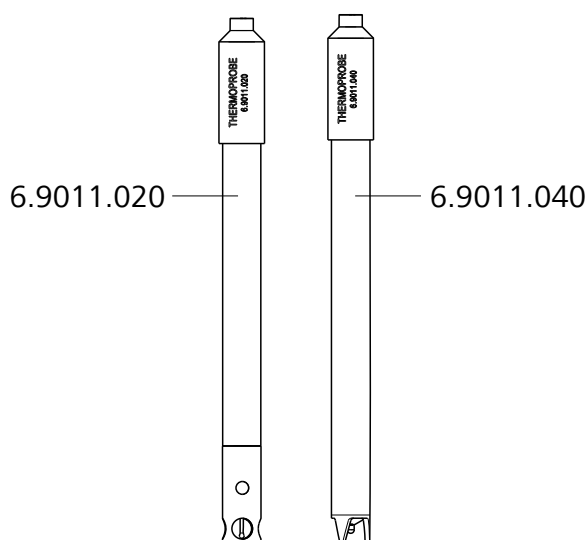


Figure 13 Thermoprobes – two models

Thermoprobe with glass shaft (6.9011.020)

For titrations in aqueous and nonaqueous media. Not HF-resistant.

Thermoprobe with shaft made of PP (6.9011.040)

For titrations in aqueous media. HF-resistant. Can also be used in acidic solutions containing fluoride.

6.1.2 Cleaning and storage

The sensor can be cleaned by rinsing or brief immersion in a suitable solvent. Immerse all openings in the case of the 6.9011.020.

The sensor shaft can be carefully cleaned with a cloth.

**WARNING**

The temperature sensor is very sensitive and can be considerably damaged by contact with fingers or objects.

**WARNING**

The PTFE protective sleeve of the 6.9011.020 cannot and must not be dismantled.

The sensor must always be stored in a dry place. After each sample series, rinse the sensor with water or other cleaning solutions.

6.2 Maximum dosing and filling rate

The maximum dosing rate and maximum filling rate for the dosing unit depend on the cylinder volume:

Cylinder volume	Maximum rate
2 mL	6.67 mL/min
5 mL	16.67 mL/min
10 mL	33.33 mL/min
20 mL	66.67 mL/min
50 mL	166.00 mL/min

Independent of the cylinder volume, values ranging from 0.01 to 166.00 mL/min can always be entered. When the function is carried out the rate will be, if necessary, decreased automatically to the highest possible value.



6.3 Remote interface

The 6.2148.010 Remote Box allows devices to be controlled which cannot be connected directly to the MSB interface of the 859 Titrotherm.

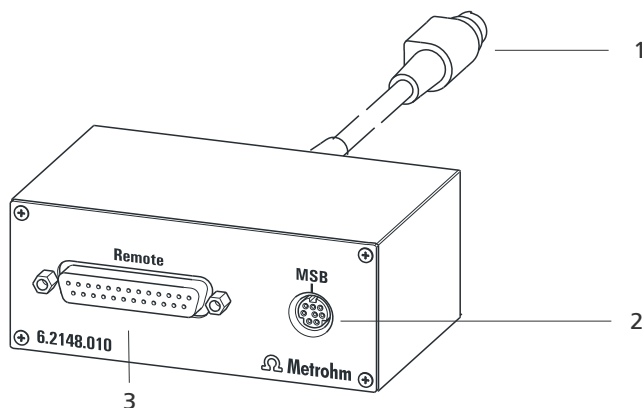


Figure 14 Connectors of the Remote Box

1 Cables

For connecting to an MSB connector of the 859 Titrotherm.

2 MSB connector

Metrohm Serial Bus. For connecting external dosing devices or stirrers.

3 Remote connector

For connecting instruments with a remote interface.

6.3.1 Pin assignment of the remote interfaces

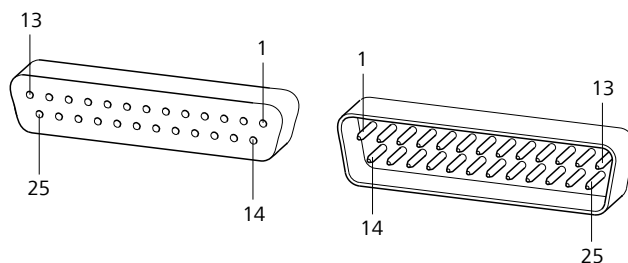
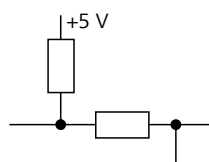


Figure 15 Pin assignment of remote socket and remote plug

The above figure of the pin assignment of a Metrohm remote interface does not only apply for the Remote Box, but also for all Metrohm devices with 25-pin D-Sub remote connectors.

Inputs



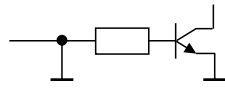
approx. 50 kΩ Pull-up

$t_p > 20$ ms

active = low, inactive = high

The input lines can be scanned with the **SCAN** command.

Outputs



Open Collector

$t_p > 200 \text{ ms}$

active = low, inactive = high

$I_C = 20 \text{ mA}$, $V_{CE0} = 40 \text{ V}$

+5 V: maximum load = 20 mA

The output lines can be set with the **CTRL** command.

Table 1 Inputs and outputs of the remote interface

Assignment	Pin no.	Assignment	Pin no.
Input 0	21	Output 0	5
Input 1	9	Output 1	18
Input 2	22	Output 2	4
Input 3	10	Output 3	17
Input 4	23	Output 4	3
Input 5	11	Output 5	16
Input 6	24	Output 6	1
Input 7	12	Output 7	2
0 volts / GND	14	Output 8	6
+5 volt	15	Output 9	7
0 volts / GND	25	Output 10	8
		Output 11	13
		Output 12	19
		Output 13	20



7 Technical specifications

7.1 Measuring interface NTC 10 kOhm

<i>Measuring range</i>	-10...+50 °C
<i>Resolution</i>	0.00001 °C
<i>Measuring cycle</i>	20 ms at 50 Hz mains frequency
<i>Measurement imprecision</i>	±0.1 °C

7.2 Interfaces and connectors

<i>Controller connector</i>	USB Upstream port (9-pin Mini DIN socket) for connecting a computer for controlling the instrument.
<i>MSB connectors MSB1...MSB4</i>	Four 9-pin Mini DIN sockets for connecting dosing devices (Dosino/Dosimat), stirrers, etc.
<i>USB connectors 1/2</i>	Two USB Downstream Ports (Type A sockets), each 500 mA, for connecting Metrohm instruments or USB peripheral devices of other manufacturers.

7.3 Mains connection

<i>Voltage</i>	100...240 V (±10 %)
<i>Frequency</i>	50...60 Hz
<i>Power consumption</i>	maximum 45 W
<i>Fuse</i>	Electronic overload protection

7.4 Ambient temperature

<i>Nominal function range</i>	+5...+45 °C
<i>Storage</i>	-20...+60 °C
<i>Transport</i>	-40...+60 °C

7.5 Reference conditions

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

7.6 Dimensions

<i>Width</i>	142 mm
<i>Height</i>	64 mm
<i>Depth</i>	230 mm
<i>Weight</i>	2.0 kg
<i>Material</i>	
<i>Housing</i>	Metal housing, surface-treated

Index

6.2151.000 controller cable	10
700 Dosino	14
800 Dosino	14
801 Stirrer	14
803 Ti Stand	14
804 Ti Stand	14
805 Dosimat	14

A

Antidiffusion tip	18
-------------------------	----

B

Bottle holder	8
---------------------	---

C

Cleaning	22
Computer	
Connect	10
Connect	
Computer	10
Dosing device	14
MSB devices	12
Power grid	9
Remote Box	15
Stirrer or titration stand	14
Connector	
Controller	7
MSB	3, 7
USB	3, 7
Controller connector	26

D

Data chip	21
Device software	
Update	2
Dosing command	3
Dosing commands	3
Dosing device	
Connect	14
Dosing rate	
Maximum	23
Dosing unit	8, 21
Dosino	8
Driver software	
Install	10

E

Electrostatic charge	6
----------------------------	---

F

Filling rate	
Maximum	23

G

Glass shaft	22
-------------------	----

H

HF-resistant	22
--------------------	----

I

Installation	
Driver software	10
Instrument description	3
Instrument type	7
Intended use	3
Intermediate cone	18

L

LED	
On	7, 21
Status	21
Link stopper	18

M

Magnetic stirrer	
Connect	14
Mains connection	7
Maintenance	20
Measuring interface	3, 7, 26
Measuring range	26
Metrohm Serial Bus MSB, see also	
"MSB"	12
MSB	
Connect devices	12
MSB connector	3, 26

O

Overview of the instrument	7
----------------------------------	---

P

Pins	24
------------	----

Piston jammed	21
Power connection	9, 10
Propeller stirrer	18

R

Remote	
Input	24
Interface	24
Output	25
Remote Box	
Connect	15
Pin assignment	24

S

Safety instructions	5
Sensor	18
Connect	17
Serial number	7
Service	5
SGJ sleeve	18
Stacking frame	8
Stirrer	18
Connect	14
Stirring propeller	18
Storage	22
Supply voltage	6

T

TET	3
Thermoprobe	17, 18, 19, 22
tiamo	3
Titration cell	
Set up	18
Titration mode	3
TET	3
Titration stand	14
Connect	14

U

Update	
Device software	2
USB connector	3, 16, 26