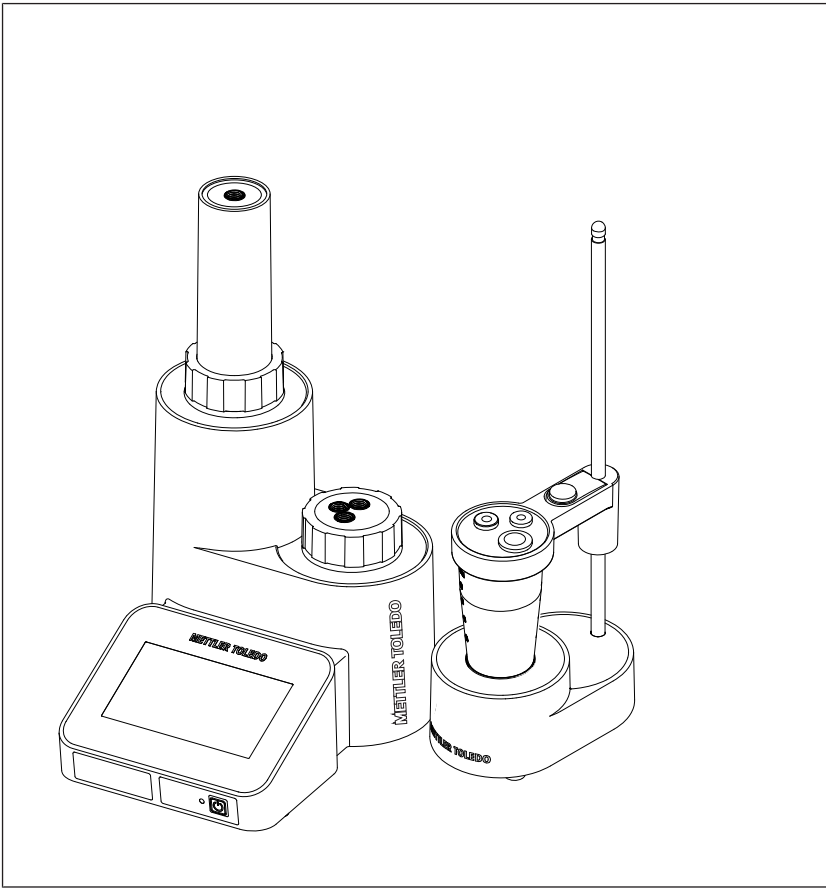
User Manual

EasyPlus™ Titration

Easy Dose / Easy EPM



METTLER TOLEDO

Table of Contents

1 Introduction

Thank you for choosing a METTLER TOLEDO EasyPlus™ titration instrument.

- Easy Dose is an easy-to-operate instrument for volumetric dispensing applications.
- Easy EPM is an easy-to-operate instrument for volumetric dispensing applications and manual titrations.

About this document

This document provides you with the information you need to get started with your METTLER TOLEDO Easy Dose and Easy EPM instrument.

The instructions in this document refer to Easy Dose and Easy EPM instruments running firmware version 1.0.0 or higher.

For a full description of the instruments and their functions, refer to the Reference Manual supplied online.

▶ www.mt.com/library

If you have any additional questions, contact your authorized METTLER TOLEDO dealer or service representative.

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Conventions and symbols

Refers to an external document.

Elements of instructions

- Prerequisites

1 Steps

2 …

⇨ Intermediate results

⇨ Results

2 Safety information

Two documents named "User Manual" and "Reference Manual" are available for this instrument.

- The User Manual is printed and delivered with the instrument.
- The electronic Reference Manual contains a full description of the instrument and its use.
- Keep both documents for future reference.
- Include both documents if you transfer the instrument to other parties.

Only use the instrument according to the User Manual and the Reference Manual. If you do not use the instrument according to these documents or if the instrument is modified, the safety of the instrument may be impaired and Mettler-Toledo GmbH assumes no liability.

User Manual and Reference Manual are available online.

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2.1 Definitions of signal words and warning symbols

Safety notes contain important information on safety issues. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results. Safety notes are marked with the following signal words and warning symbols:

Signal words

WARNING A hazardous situation with medium risk, possibly resulting in death or severe injury if not avoided.

NOTICE A hazardous situation with low risk, resulting in damage to the instrument, other material damage, malfunctions and erroneous results, or loss of data.

Warning symbols

Electric shock

2.2 Product specific safety notes

Intended use

This instrument is intended to be used by trained staff and is intended to dispense liquids and measure liquid samples that are compatible with the materials with which they come into contact.

Any other type of use and operation beyond the limits of use stated by Mettler-Toledo GmbH without consent from Mettler-Toledo GmbH is considered as not intended.

Responsibilities of the instrument owner

The instrument owner is the person holding the legal title to the instrument and who uses the instrument or authorizes any person to use it, or the person who is deemed by law to be the operator of the instrument. The instrument owner is responsible for the safety of all users of the instrument and third parties.

METTLER TOLEDO assumes that the instrument owner trains users to safely use the instrument in their workplace and deal with potential hazards. METTLER TOLEDO assumes that the instrument owner provides the necessary protective gear.

Safety notes

⚠ WARNING

Danger of death or serious injury due to electric shock!

Contact with parts that carry a live current can lead to death or injury.

1 Only use the METTLER TOLEDO power supply cable and AC adapter designed for your instrument.
2 Connect the power cable to a grounded power outlet.
3 Keep all electrical cables and connections away from liquids and moisture.
4 Check the cables and the power plug for damage and replace damaged cables and power plugs.

NOTICE

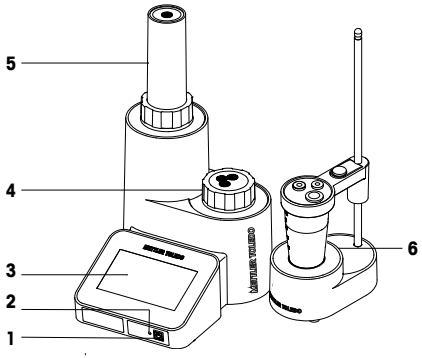
Risk of damage to the instrument due to the use of unsuitable parts!

Using unsuitable parts with the instrument can damage the instrument or cause it to malfunction.

– Only use parts from METTLER TOLEDO that are intended to be used with your instrument.

3 Design and Function

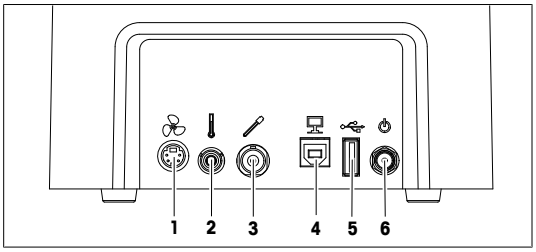
3.1 Instrument overview



No.	Name	Function
1	Power button	Start up and shut down the instrument
2	Status LED	Indicates the status of the instrument: • Green: the instrument is ready for use • Flashing green: instrument is busy • No light: the instrument is shut down.
3	Touch screen	Display information and is used to enter information
4	Valve	Control the flow direction of solutions
5	Burette	Dispense standard solutions or titrants
6	EasyStir GT [1)]	Stir solutions

[1)]Only included in the scope of delivery for Easy EPM.

3.2 Rear panel



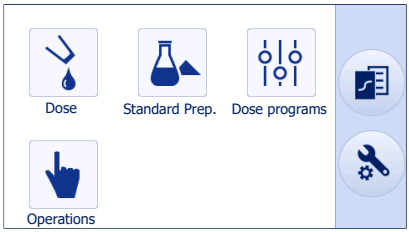
No.	Icon	Function
1		Mini-DIN socket to connect a stirrer
2		RCA - Cinch socket to connect a NTC temperature sensor[1)]
3		BNC socket to connect a pH sensor[1)]

No.	Icon	Function
4		USB-B socket for internal use
5		USB-A socket to connect USB devices, for example balances, printers or an EasyWheel.
6		DC socket to connect the AC adapter.

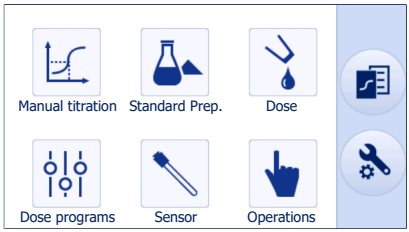
[1] For Easy EPM only.

3.3 Home screen and applications

Easy Dose



Easy EPM



Icon	Name	Description
	Dose	Dispense a defined volume of a solution.
	Standard preparation	Prepare a standard, stock or calibration solution using a defined amount of substance.
	Dose programs	Dispense a solution using one of the following modes: • **Volume & Duration**: the dosing speed is calculated based on the volume and the duration that users define. • **Volume & Speed**: the duration is calculated based on the volume and the dosing speed that users define. • **Speed & Duration**: the volume is calculated based on the dosing speed and the duration that users define. • **Interval**: fixed volumes are added in intervals. Users define the volume, the number of intervals and the delay between intervals.
	Manual titration	Perform a manual endpoint titration. Users define the endpoint by stopping the titration when the color of the solution changes. The instrument calculates a result based on the dispensed volume.
	Sensor	Calibrate a sensor or measure pH values in aqueous and non-aqueous solutions.
	Operations	Control some activities outside of one of the previously described applications: • Stir solutions using a connected stirrer. • Rinse the burette. • Define the properties of a titrant and perform a titrant determination.[1]
	Results	Access the results of the latest 100 manual titrations and standard preparations.

Icon	Name	Description
	Setup & Tools	Access the following functions • **Settings**: change instrument settings. • **Diagnostics**: run diagnostics. • **FW Update**: update the firmware. • **Factory reset**: restore factory settings. • **Adjust screen**: adjust the touch screen. • **Tutorial**: start the tutorial.

[1)] For Easy EPM only.

You can find detailed information about the configuration of applications and settings in the Reference Manual.

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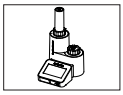
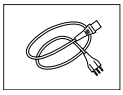
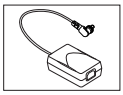
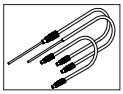
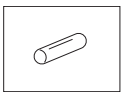
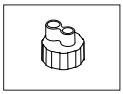
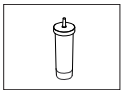
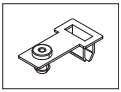
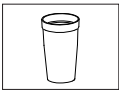
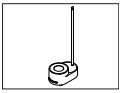
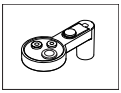
4 Installation and commissioning

4.1 Scope of Delivery

Part	Order number	Easy Dose	Easy EPM
 Dosing instrument • Instrument • Burette 50 mL • Valve	–	•	–
 Titrator • Instrument • Burette 20 mL • Valve	–	–	•
 Power cable Country specific	–	•	•
 AC adapter 100 - 240 V AC	51105795	•	•
 EasyPlus Tubing Set Instrument • Blue tube • Red tube • Green tube	30065464	•	•
 Stirrer bar	30060027	•	•
 Bottle head incl. flat seal GL45/M12	30060023	•	•
 EasyPlus Drying Tube	30044701	•	•

Part		Order number	Easy Dose	Easy EPM
	Tube holder	30459710	•	–
	Beaker (10 pcs) 100 mL, PP	-	–	•
	EasyStir GT	30065467	–	•
	EasyPlus Titration Head GT	30041102	–	•
	User Manual	–	•	•
	Declaration of conformity	–	•	•
	Test report	–	•	•
	2-pager standard preparation	–	•	•
	2-pager manual titration	–	–	•

4.2 Unpack the instrument

1 Remove the instrument from the protective packaging.
2 Store the packing material for later transport over long distances.
3 Check if you received all parts listed in the scope of delivery.
4 Inspect the parts visually for flaws or damage.
5 If parts are missing or damaged, report it to your authorized METTLER TOLEDO dealer or service representative.

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4.3 Download the Reference Manual

1 Go to the website www.mt.com/library.
2 Select the **Technical Documentation** tab.
3 Enter the product type in the search field and start the search.
4 Select the Reference Manual from the result list.

5 Select the link.
⇨ The Reference Manual is either opened or downloaded depending on the browser settings.
6 Check which firmware version is installed on your instrument.
7 If the Reference Manual is not written for the installed firmware version, contact your authorized METTLER TOLEDO dealer or service representative.

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See also

Introduction ▸ Page 3

4.4 Position the instrument

The instrument has been developed for indoor operation in a well-ventilated area.

The following site requirements apply:

- Ambient conditions within the limits specified in the technical data
- No powerful vibrations
- No direct sunlight
- No corrosive gas atmosphere
- No explosive atmosphere
- No powerful electric or magnetic fields

Procedure

1 Place the instrument on a level surface.
2 Make sure that the distance between the instrument and any wall is at least 6 cm.

See also

Technical data ▸ Page 28

4.5 Connect the instrument to the power supply

The instrument is supplied with an AC adapter. The AC adapter is suitable for all line voltages in the range of 100…240 V AC, 50 / 60 Hz.

⚠ WARNING

Danger of death or serious injury due to electric shock!

Contact with parts that carry a live current can lead to death or injury.

1 Only use the METTLER TOLEDO power supply cable and AC adapter designed for your instrument.
2 Connect the power cable to a grounded power outlet.
3 Keep all electrical cables and connections away from liquids and moisture.
4 Check the cables and the power plug for damage and replace damaged cables and power plugs.

NOTICE

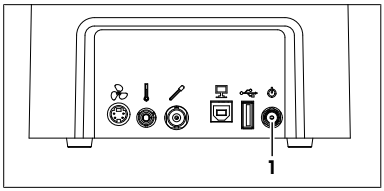
Danger of damage to the AC adapter due to overheating!

If the AC adapter is covered or in a container, it is not sufficiently cooled and overheats.

1 Do not cover the AC adapter.
2 Do not put the AC adapter in a container.

1 Install the cables in such a way that they cannot be damaged or interfere with operation.
2 Insert the plug of the power cable into the socket of the AC adapter.

3 Insert the plug of the AC adapter into the socket (1) on the rear panel.
4 Tighten the knurled nut to secure the plug.
5 Insert the plug of the power cable into a grounded power outlet that is easily accessible.



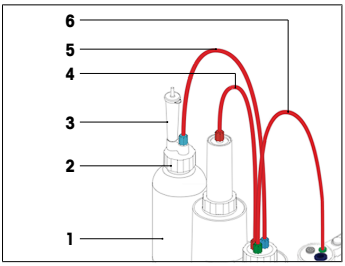
4.6 Disconnect the instrument from the power supply

- The instrument is shut down.

1 Pull the plug of the power cable out of the power outlet.
2 Pull the plug of the AC adapter out of the socket on the rear panel.

4.7 Connect the tubing

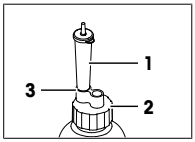
4.7.1 Overview of the tubing



No.	Name	Function
1	Bottle	Contains the solvent or the titrant
2	Bottle head	Closes the bottle
3	Drying tube	Keeps the solution dry
4	Red tube	Transfers the solution from the burette to the valve and vice-versa.
5	Blue tube	Transfers the solution from the bottle to the valve.
6	Green tube	Transfers the solution from the valve to the sample beaker.

4.7.2 Assemble and install the bottle head

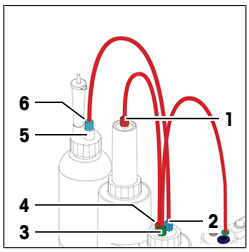
1 Place the flat seal in the bottle head (2).
2 Check that the flat seal is correctly seated.
3 Screw the bottle head (2) on the bottle.
4 If the chemicals you use need to be kept free of water or carbon dioxide, fill the drying tube (1) with a suitable absorbent.



5 Place the drying tube (1) in the opening (3) of the bottle head.

4.7.3 Connect the tubes

1 Screw one of the connectors of the blue tube (6) into the opening (5) on the bottle head and tighten it.
2 Push the blue tube into the bottle until it ends just above the bottom.
3 Screw the other blue connector (2) into the blue opening of the valve and tighten it.
4 Screw one of the connectors of the red tube (1) into the red opening on the burette and tighten it.
5 Screw the other red connector (4) into the red opening on the valve and tighten it.
6 Screw the connector of the green tube (3) into the green opening of the valve and tighten it.



4.8 Install accessories

The installation of additional accessories is described in the Reference Manual.

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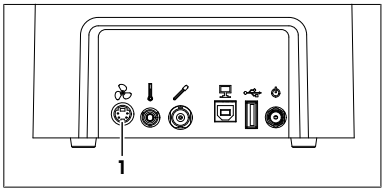
4.8.1 Set up a stirrer

4.8.1.1 Connect a stirrer

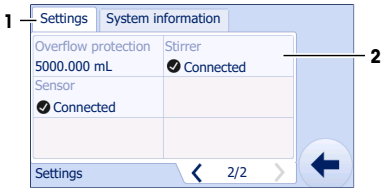
1 Insert the plug of the stirrer into the stirrer socket (1) on the rear panel.
2 If you use an EasyStir, insert the free end of the green tube into the green opening of the EasyStir head.



4.8.1.2 Activate the stirrer

- The stirrer is connected.

1 Go to > > **Settings** (1).
2 Go to page 2.
3 Tap **Stirrer** (2).
⇨ The status changes to **Connected**.

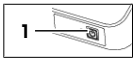


5 Operation

5.1 Start up the instrument

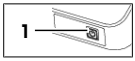
- The instrument is connected to the power supply.

1 Press the power button (1).
⇨ The status LED starts blinking and the welcome window opens.
⇨ The instrument starts up and detects connected devices.
⇨ The instrument is ready for use when the status LED stops blinking.
⇨ If you start the instrument the first time, the tutorial opens.
2 If needed, follow the instructions in the tutorial to configure the instrument.



5.2 Shut down the instrument

– Press the power button (1).



⇨ The status LED starts blinking and the instrument stops running tasks and shuts down.

⇨ When the status LED and the screen are dark, the instrument is shut down.

⇨ The control circuit for the power button is energized. The rest of the instrument is not energized.

Shut down the instrument in emergency situations

– Pull the plug of the power cable out of the power outlet.

5.3 Example: Preparation of a sodium-ion standard

The following chapters show you how to prepare an Na^+ standard with a concentration of 1000 ppm.

Summary of the configuration

- Target concentration: 1000 ppm Na^+
- Source of Na^+: $NaCl_{(s)}$ (high purity)
- Solvent: deionized water
- No stirrer

5.3.1 Set up the system

Material

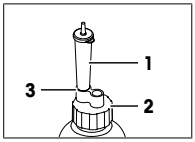
- $NaCl_{(s)}$ (high purity)
- Solvent: deionized water
- Standard bottle: glass bottle with wide neck (volume ≥100 mL)
- Waste bottle: glass bottle with wide neck
- Clean tissues

Connect the tubes

1 Place the flat seal in the bottle head (2).

2 Check that the flat seal is correctly seated.

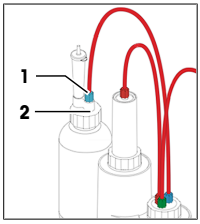
3 Screw the bottle head (2) on the solvent bottle with deionized water.



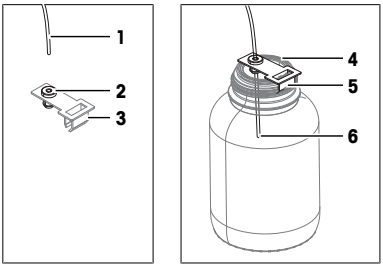
4 Place the empty drying tube (1) in the opening (3) of the bottle head.

5 Screw the connector of the blue tube (1) into the opening (2) of the bottle head and tighten it.

6 Push the blue tube into the solvent bottle until it ends just above the bottom.

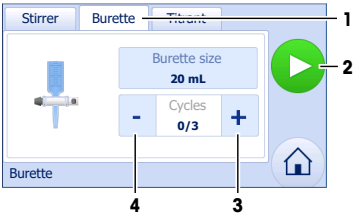


7 Insert the end of the green tube (1) into the opening (2) of the tube holder (3).
8 Push the split end of the tube holder (5) over the rim of the waste bottle (4).
9 Make sure the end of the green tube (6) is above the waste level.
10 Make sure that the tension of the green tube does not lift the tube holder out of the waste bottle.



Fill tubes, burette and valve

1 Go to > > **Burette** (1).
2 Use the plus (3) and minus (4) icon to set the number of rinse cycles to 3.
3 Tap (2).
⇨ The instrument performs three rinse cycles.
⇨ Tubes, burette and valve are filled with deionized water and are free of air bubbles.

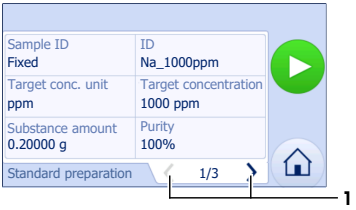


Prepare the sample

1 Weigh approximately 0.2 g NaCl and write down the exact weight.
2 Put the NaCl into the empty standard bottle.
3 Remove the tube holder from the waste bottle and dry the end of the green tube with a clean tissue.
4 Install the tube holder on the standard bottle.
5 Make sure the green tube ends just above the bottom of the standard bottle.
6 Make sure that the tension of the green tube does not lift the tube holder out of the standard bottle.

5.3.2 Configure the standard preparation

1 Go to > .
2 Change the parameter settings to the values shown in the following table.
3 Use the arrows (1) to move between windows.



Parameter	Setting	Explanation
Sample ID	**Fixed**	The text entered in the field **ID** is used to identify the sample.
ID	Na_1000ppm	"Na_1000pm" is used to identify the sample.
Target conc. unit	**ppm**	ppm is used as concentration unit.
Target concentration	1000	A standard with the concentration 1000 ppm is prepared.
Substance amount	Weight of NaCl added to the standard bottle For example: 0.20000 g	The instrument uses this value to calculate the volume of solvent that is needed to prepare the standard.

Parameter	Setting	Explanation
Purity	Purity of NaCl as declared by the manufacturer For example: 100 %	The instrument uses this value to calculate the volume of solvent that is needed to prepare the standard.
Mass fraction	0.393	The mass of Na^+ accounts for 39.3 % of the mass of NaCl.
Solvent density	Density of deionized water at the measuring temperature For example: 0.998 g/mL	The instrument uses this value to calculate the volume of solvent that is needed to prepare the standard.
Factor f	1	The calculation of the volume is not corrected because a multiplication by 1 does not change the value.
Volume	Calculated volume of deionized water that is needed (read only) For example: 78.679 mL	78.679 mL deionized water are needed to prepare the standard. The instrument calculates this volume using the values of the following parameters. • **Target conc. unit** • **Target concentration** • **Substance amount** • **Purity** • **Mass fraction** • **Solvent density** • **Factor f**
Dosing speed	**Medium**	The deionized water is dispensed with medium speed.
Printout	**None**	The result is not printed.
Export	**None**	The result is not exported.

You can find detailed information about the configuration of applications in the Reference Manual.

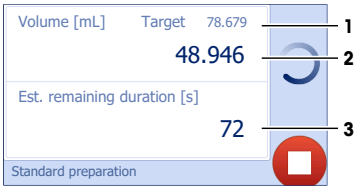
▶ www.mt.com/library

5.3.3 Prepare the standard

1 To start the application, tap ▶ (1).

⇨ The instrument dispenses deionized water into the standard bottle.

⇨ The target volume (1), the dispensed volume (2) and an estimate of the remaining duration (3) are displayed.



2 When the final result and the ⌂ button are displayed, the application is completed.

3 Remove the tube holder from the standard bottle and dry the end of the green tube with a clean tissue.

5.4 Example: Manual titration of a hydrochloric acid solution (Easy EPM only)

The following chapters show you how to perform a manual titration of an HCl solution with a 0.1 mol/L NaOH solution as titrant. EasyStir is used as stirrer.

Summary of the process

- Perform a titrant determination of the titrant NaOH using the primary standard $KHP_{(s)}$ and the color indicator phenolphthalein.
- Perform a manual titration to determine the concentration of an HCl solution, using the titrant NaOH and the color indicator phenolphthalein. The instrument uses the result of the titrant determination to calculate the HCl concentration.

5.4.1 Set up the system

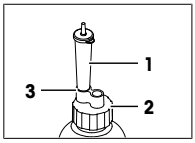
Material

- Titrant: 0.1 mol/L NaOH solution
- Primary standard: $KHP_{(s)}$
- Color indicator: Phenolphthalein
- Deionized water
- 2 beakers
- Clean tissue

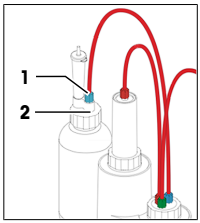
Connect the tubes

- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

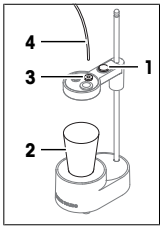
1 Place the flat seal in the bottle head (2).
2 Check that the flat seal is correctly seated.
3 Screw the bottle head (2) on the titrant bottle with 0.1 mol/L NaOH solution.
4 Fill the drying tube (1) with an absorbent for CO_2.
5 Place the drying tube (1) in the opening (3) of the bottle head.



6 Screw the connector of the blue tube (1) into the opening (2) of the bottle head and tighten it.
7 Push the blue tube into the titrant bottle until it ends just above the bottom.



8 Place a beaker (2) on the EasyStir.
9 Insert the end of the green tube (4) into the green opening (3) of the EasyStir head.
10 Press and hold the release button (1) and move the EasyStir head down, until it sits firmly on the beaker.
11 Make sure that the end of the green tube is above the waste.



Fill tubes, burette and valve

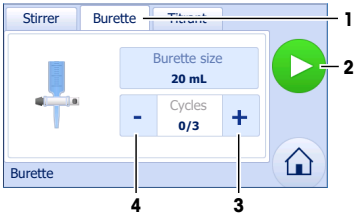
1 Go to ⌂ > ☝ > **Burette** (1).

2 Use the plus (3) and minus (4) icon to set the number of rinse cycles to 3.

3 Tap ▶ (2).

⇨ The instrument performs three rinse cycles.

⇨ Tubes, burette and valve are filled with titrant and are free of air bubbles.



4 Move the EasyStir head up and dry the end of the green tube with a clean tissue.

5 Remove the waste beaker from the EasyStir.

6 Dispose of the waste as required by the safety data sheet of the chemicals you use and the rules of your workplace.

Prepare the standard for the titrant determination

- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

1 Weigh 0.08…0.12 g KHP and write down the exact weight.

2 Put the KHP into an empty beaker.

3 Add approximately 50 mL deionized water to the beaker.

4 Add 3 drops of phenolphthalein to the beaker.

5 Place the beaker on the EasyStir.

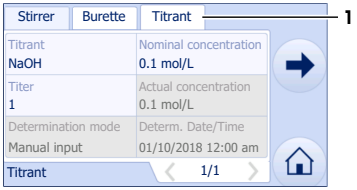
6 Move the EasyStir head down, until it sits firmly on the beaker.

7 Push the end of the green tube into the beaker until it is close to the bottom but does not collide with the stirrer bar.

5.4.2 Configure the titrant

1 Go to ⌂ > ☝ > **Titrant** (1).

2 Change the parameter settings to the values shown in the following table.



Parameter	Setting	Explanation
Titrant	NaOH	A solution of NaOH is used as titrant.
Nominal concentration	0.1 mol/L	The nominal concentration as declared on the bottle is 0.1 mol/L.
Titer	1	The instrument uses the titer as correction factor to determine the actual concentration. Per default a titer of 1 is saved on the instrument. The instrument adjusts this factor based on the result of the titrant determination.
Actual concentration	0.1 mol/L (read only)	Actual concentration of the titrant as calculated by the instrument. **Actual concentration = Nominal concentration * Titer**

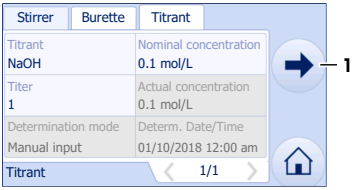
Parameter	Setting	Explanation
Determination mode	**Manual input** (read only)	The value for **Titer** has been entered manually. This setting is changed to **Automatic** when you have performed the titrant determination.
Determ. Date/Time	Date and time (read only)	Shows when the value for **Titer** was changed the last time.

You can find detailed information about the configuration of applications in the Reference Manual.

▶ www.mt.com/library

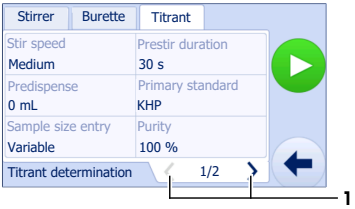
5.4.3 Configure the titrant determination

1 Tap ➡ (1).



2 Change the parameter settings to the values shown in the following table.

3 Use the arrows (1) to move between windows.



Parameter	Setting	Explanation
Stir speed	**Medium**	The stir speed of EasyStir is set to **Medium**.
Prestir duration	30 s	The solution is stirred for 30 s to dissolve the KHP in the deionized water.
Predispense	0 mL	No titrant is added to the KHP solution before users can start to control the dispensing of the titrant.
Primary standard	**KHP**	The instrument uses predefined properties of KHP to calculate the titer.
Sample size entry	**Variable**	Users are prompted to enter the weight of KHP when they start the titrant determination.
Purity	Purity of KHP as declared by the manufacturer For example: 100%	The instrument uses this value to calculate the titer.
Equivalence number	1	The equivalence number is 1 because 1 mol KHP reacts with 1 mol NaOH.

Parameter	Setting	Explanation
Printout	**None**	The result is not printed.
Export	**None**	The result is not exported.

You can find detailed information about the configuration of applications in the Reference Manual.

▶ www.mt.com/library

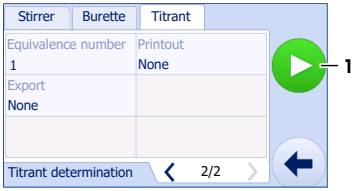
5.4.4 Perform the titrant determination

Start the application

- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

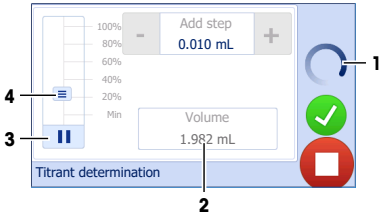
1 Tap ▶ (1).
   ⇨ The sample size window opens.
2 Enter the weight of the KHP and tap ✓.
   ⇨ The instrument stirs the solution for 30 s.

⇨ The **Titrant determination** window opens but the instrument does not dispense any titrant.



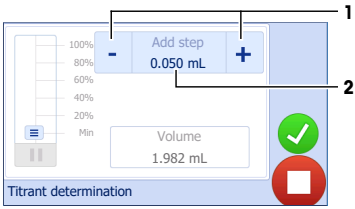
Dispense titrant continuously

1 To start dispensing, move the slider (4) up.
   ⇨ The instrument dispenses titrant with the set percentage of the maximum dispensing speed.
   ⇨ The revolving circle (1) indicates that titrant is being dispensed.
   ⇨ **Volume** (2) shows the dispensed volume.
2 Observe the solution and look for a color change.
3 As soon as you see any color change, tap pause (3).



Dispense titrant stepwise

1 Wait and check if the intensity of the color remains constant or fades.
2 If the color fades, use the minus and plus sign to adjust the volume you want to add.
3 Tap **Add step** (2).
   ⇨ The instrument dispenses the defined volume of the titrant.
4 Repeat the steps above until the intensity of the color remains constant.



End the titrant determination

1 When the intensity of the color remains constant, tap ✓.
   ⇨ Based on the dispensed volume, the instrument calculates the titer and the actual concentration.
   ⇨ The **Titrant results** window opens.

2 Tap **OK**.

⇨ The results window opens and shows the dispensed volume (1), the titer (2) and the calculated titrant concentration (3).

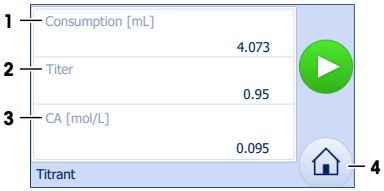
3 Tap (4).

⇨ The home screen opens.

4 Move the EasyStir head up and dry the end of the green tube with a clean tissue.

5 Remove the beaker from the EasyStir.

6 Dispose of the waste as required by the safety data sheet of the chemicals you use and the rules of your workplace.



5.4.5 Prepare the sample for the manual titration

Material

- Deionized water
- 0.1 mol/L HCl solution
- Phenolphthalein
- Beaker

Prepare the sample

- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

1 Put approximately 50 mL deionized water into the beaker.

2 Add 6 mL of 0.1 mol/L HCl solution to the beaker.

3 Add 3 drops of phenolphthalein to the beaker.

4 Place the beaker on the EasyStir.

5 Move the EasyStir head down, until it sits firmly on the beaker.

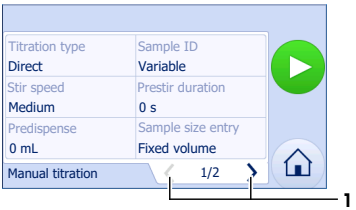
6 Push the end of the green tube into the beaker until it is close to the bottom but does not collide with the stirrer bar.

5.4.6 Configure the manual titration

1 Go to > .

2 Change the parameter settings to the values shown in the following table.

3 Use the arrows (1) to move between windows.



Parameter	Setting	Explanation
Titration type	**Direct**	The titrant reacts directly with the HCl in the sample.
Sample ID	**Variable**	Users are prompted to enter the identification of the sample when they start the manual titration.
Prestir duration	0 s	The sample is not stirred before titrant is added.
Predispense	0 mL	No titrant is added to the sample before users can start to control the dispensing of the titrant.

Parameter	Setting	Explanation
Sample size entry	**Fixed volume**	Users must add the volume defined in **Sample size**.
Sample size	6 mL	The instrument uses the sample size 6 mL to calculate the HCl concentration.
Calculation	**Content [mol/L]**	The instrument calculates the concentration of the sample based on the following values. • Added volume of titrant • Titrant concentration as calculated in the titrant determination • Sample size • Equivalence number
Equivalence number	1	The equivalence number is 1 because 1 mol NaOH reacts with 1 mol HCl.
Printout	**None**	The result is not printed.
Export	**None**	The result is not exported.

You can find detailed information about the configuration of applications in the Reference Manual.

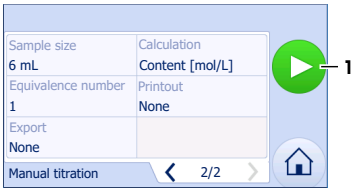
▶ www.mt.com/library

5.4.7 Perform the manual titration

Start the application

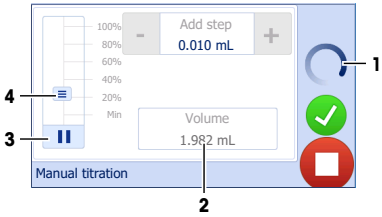
- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

1 Tap ▶ (1).
   ⇨ The sample ID window opens.
2 Enter the identification of the sample and tap ✓.
   ⇨ The **Manual titration** window opens but the instrument does not dispense any titrant.



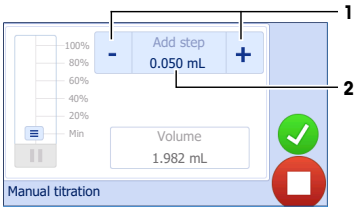
Dispense titrant continuously

1 To start dispensing, move the slider (4) up.
   ⇨ The instrument dispenses titrant with the set percentage of the maximum dispensing speed.
   ⇨ The revolving circle (1) indicates that titrant is being dispensed.
   ⇨ **Volume** (2) shows the dispensed volume.
2 Observe the solution and look for a color change.
3 As soon as you see any color change, tap pause (3).



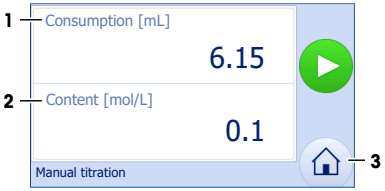
Dispense titrant stepwise

1 Wait and check if the intensity of the color remains constant or fades.
2 If the color fades, use the minus and plus sign to adjust the volume you want to add.
3 Tap **Add step** (2).
   ⇨ The instrument dispenses the defined volume of the titrant.
4 Repeat the steps above until the intensity of the color remains constant.



End the manual titration

1 When the intensity of the color remains constant, tap ✓.
   ⇨ Based on the dispensed volume, the instrument calculates the HCl concentration of the sample.
   ⇨ The results window opens and shows the dispensed volume (1) and the calculated HCl concentration of the sample (2).
2 Tap ⌂ (3).
   ⇨ The home screen opens.
3 Move the EasyStir head up and dry the end of the green tube with a clean tissue.
4 Remove the beaker from the EasyStir.
5 Dispose of the waste as required by the safety data sheet of the chemicals you use and the rules of your workplace.

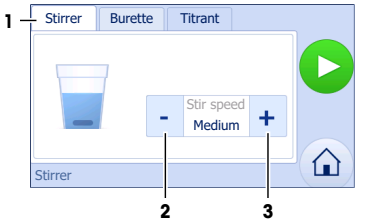


5.5 Use a stirrer outside of an application

The following stir speeds are available. The values are theoretic and subject to the tolerances of the motors:

Stir speed	rpm
Low	417
Medium	562
High	697
Maximum	731

1 Go to ⌂ > ☝.
2 Tap **Stirrer** (1).
3 Tap on the minus (2) or plus (3) icon to change the stir speed.
4 To start the stirrer, tap ▶.
5 To stop the stirrer, tap ■.



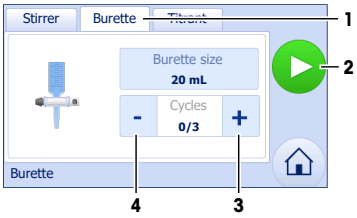
See also

Set up a stirrer ▸ Page 11

5.6 Use the burette outside of an application

1 Make sure that the end of the green tube is in a sample or waste container.
2 Go to ⌂ > ☝ > **Burette** (1).

3 To change the number of the cycles the burette performs, tap the plus (3) or minus (4) icon.
4 To start the burette, tap ▶ (2).
5 To stop the burette, tap ■.



6 Maintenance

In this chapter, you find descriptions of the maintenance tasks you can perform yourself. Any other maintenance tasks need to be performed by a service technician that has been qualified by METTLER TOLEDO.

If you experience problems with your instrument, contact your authorized METTLER TOLEDO dealer or service representative.

METTLER TOLEDO recommends that preventive maintenance is done at least once a year through your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

6.1 Maintenance schedule

If the standard operating procedures of your company require other maintenance intervals, use the intervals listed in the standard operating procedures.

Frequency	Task	Link
Daily	If you work with aggressive chemicals, empty the burette at the end of the work day.	[Empty tubes, valve and burette ▶ Page 23]

6.2 Clean the instrument

NOTICE

Danger of damage to the instrument due to inappropriate cleaning methods!

Inappropriate cleaning agents can damage the housing or other parts of the instrument. If liquids enter the housing they can damage the instrument.

1 Make sure the cleaning agent is compatible with the material of the part you want to clean.
2 Make sure that no liquid enters the interior of the instrument.

If you have questions about the compatibility of cleaning agents, contact your authorized METTLER TOLEDO dealer or service representative.

▶ www.mt.com/contact

6.2.1 Clean the housing

NOTICE

Danger of damage to the instrument due to inappropriate cleaning agents

The housing is made of Polypropylene (PP GF30) and can be damaged by certain acids and organic solvents, such as toluene, xylene, and methyl ethyl ketone (MEK).

– Use only water and a mild detergent to clean the housing.

METTLER TOLEDO recommends the following cleaning agents:

- Water
- Water with a mild detergent

Procedure

- The instrument is shut down.

– Wipe the housing with a cloth moistened with the cleaning agent.

6.2.2 Rinse tubes, valve and burette

- Wear protective gear as required by the safety data sheet of the chemicals you use and the safety rules of your workplace.

1 Remove the green tube from the beaker and place it in a waste container.
2 Unscrew the blue tube from the bottle and place it in an empty container.
3 To empty the tubes, run the function **Burette** > **Rinse** until all tubes are empty.
4 Place the blue tube in a bottle with deionized water.
5 Run the function **Burette** > **Rinse** until the tubes are rinsed.
6 Place the blue tube in a bottle with 99.5% ethanol.
7 Run the function **Burette** > **Rinse** until the tubes are rinsed.
8 Place the blue tube in an empty bottle.
9 To empty the tubes, run the function **Burette** > **Rinse** until all tubes are empty.
10 Dispose of the waste as required by the safety data sheet of the chemicals you use and the rules of your workplace.

6.2.3 Empty tubes, valve and burette

Empty tubes, valve and burette with the burette function

1 Remove the green tube from the beaker and place it in a waste container.
2 Unscrew the blue tube from the bottle and place it in an empty container.
3 To empty the tubes, run the function **Burette** > **Rinse** until all tubes are empty.
4 Disassemble and empty the burette.

Empty tubes and burette manually

- The instrument is disconnected from the power supply.

1 Place a waste container next to the instrument.
2 Unscrew the blue tube from the bottle and place it in an empty container.
3 Unscrew the blue tube from the valve and empty it into the waste container.
4 Clean the connectors of the blue tube with a tissue.
5 Pull the green tube from the beaker and place it in the waste container.
6 Unscrew the green tube from the valve and empty it into the waste container.
7 Clean the connector and the other end of the green tube with a tissue.
8 Unscrew the red tube from the burette and place it in the waste container.
9 Unscrew the red tube from the valve and empty it into the waste container.
10 Clean the connectors of the red tube with a tissue.
11 Disassemble and empty the burette.
12 Dispose of the waste as required by the safety data sheet of the chemicals you use and the rules of your workplace.

See also

- Disassemble the burette ▸ Page 24
- Assemble the burette ▸ Page 25

6.2.4 Clean the burette

NOTICE

Danger of damage to the O-rings due to reinserting the piston!

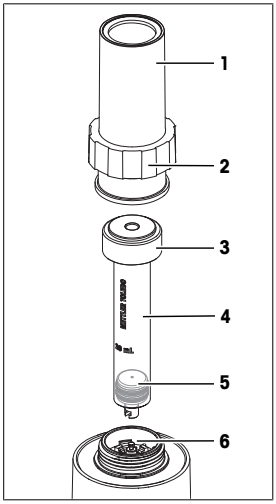
Reinserting the piston into the glass cylinder will damage the O-rings.

– Do not pull the piston out of the glass cylinder.

6.2.4.1 Disassemble the burette

- The burette, valve and tubes are rinsed and emptied.
- The instrument is disconnected from the power supply.

1 Disconnect the red tube from the top of the burette cap (3) and clean the connections with a tissue.
2 Disconnect the cap nut (2).
3 Lift off the burette cover (1) including the cap nut (2).
4 Carefully lift the glass cylinder (4), until you are able to slide the burette from the piston rod (6).
5 Remove the burette cap (3) and empty the burette into a waste bottle.
6 Replace the burette if the piston leaks, if the glass cylinder is badly scored at the edge or if crystals have formed between the seals of the piston.



See also

- Rinse tubes, valve and burette ▸ Page 23
- Empty tubes, valve and burette ▸ Page 23

6.2.4.2 Clean the burette parts

NOTICE

Danger of damage to the burette due to wrong cleaning methods

Parts of the burette can be damaged if you use the wrong cleaning agents or cleaning methods.

1 Never place O-rings in organic solvents.
2 Never attempt to remove any crystals in the cylinder by scratching with a hard object.
3 Never put the parts in a drying oven with a temperature higher than 40 °C.

The frequency of cleaning depends on the frequency of usage and the chemicals used. You should clean the burette, valve and tubes when bubbles form in the burette or the tubes or if you see deposits in the burette or the tubes.

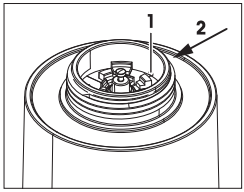
Procedure

1 Depending on the contamination caused by the chemicals, rinse cylinder, valve and tubes first with deionized water and then with high quality ethanol.
2 Remove crystals with pipe cleaners or Q tips™.
3 Dry the parts with oil-free compressed air.

6.2.4.3 Clean the burette compartment

- The instrument is disconnected from the power supply.

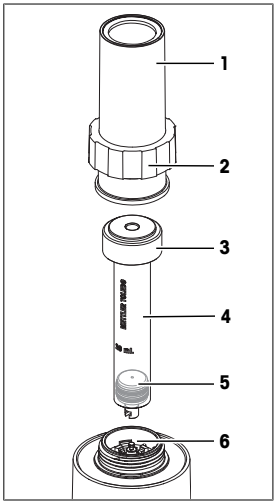
1 If there is liquid in the burette compartment, absorb the liquid with an absorbent material like a Q-tip™.
2 Push a thin rod from the rear of the instrument (2) into the outlet (1) of the burette compartment.
3 Pull the thin rod out of the outlet.
4 If the thin rod has pushed dirt into the valve compartment, take the dirt out with tweezers.



6.2.4.4 Assemble the burette

- The instrument is disconnected from the power supply.

1 Place the burette cap (3) onto the glass cylinder (4).
2 Slide the glass cylinder (4) onto the piston rod (6).
3 Carefully press the glass cylinder (4) down until it touches the housing of the instrument.
4 Place the burette cover (1) over the glass cylinder.
5 Place the cap nut (2) over the burette cover (1).
6 Screw the cap nut (2) onto the housing of the instrument and tighten it.
7 Screw one of the connectors of the red tube into the burette cap (3) and tighten it.
8 Screw the other connector of the red tube into the red opening of the valve and tighten it.
9 Make sure that all tubes are firmly connected and all cap nuts tightened.

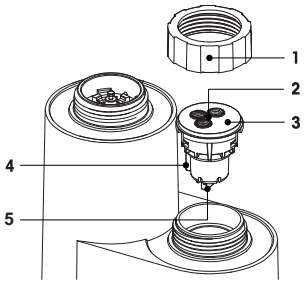


6.2.5 Clean the valve

6.2.5.1 Remove the valve

- The burette, valve and tubes are rinsed and emptied.
- The instrument is disconnected from the power supply.

1 Unscrew all tube connectors (2) from the valve and clean the tube connectors with a tissue.
2 Check that all tube connectors are removed.
3 Unscrew the cap nut (1) holding the valve.
4 Remove the valve (3).
⇨ The valve can now be replaced or cleaned.



See also

- Rinse tubes, valve and burette ▸ Page 23
- Empty tubes, valve and burette ▸ Page 23

6.2.5.2 Clean the valve

1 Place the valve for 30 minutes, or until the residue is dissolved, in deionized water or in ethanol.

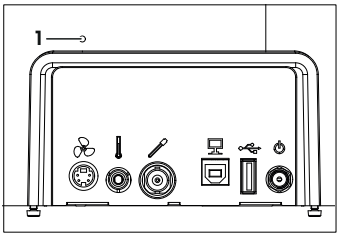
2 Take the valve out and leave it to air-dry.

6.2.5.3 Clean outlet of valve compartment

- The instrument is disconnected from the power supply.
- The valve has been removed.

1 If there is liquid in the valve compartment, absorb the liquid with an absorbent material like a Q-tip™.

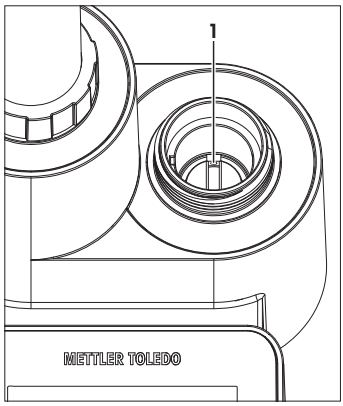
2 Push a thin rod from the rear of the instrument into the outlet (1) of the valve compartment.



3 Check that the end of the thin rod reaches the opening of the outlet (1) in the valve compartment.

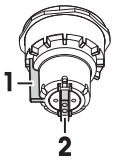
4 Pull the thin rod out of the outlet.

5 If the thin rod has pushed dirt into the valve compartment, take the dirt out with tweezers.



6.2.5.4 Install the valve

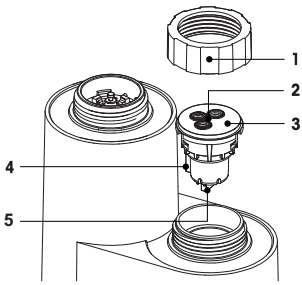
1 Make sure that the guide (1) is perpendicular to the driver bar (2).



2 Orient the valve so the guide (4) points toward the burette.

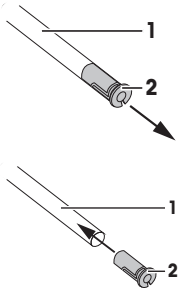
3 Insert the valve (3).

4 Screw the cap nut (1) on the instrument and tighten it.



6.3 Replace the siphon tip

1 Place a waste bottle next to the instrument.
2 Pull the green tube from the beaker and place it in a waste container.
3 Unscrew the green tube from the valve and empty the tube into the waste container.
4 Pull the siphon tip (2) with tweezers out of the tip of the green tube (1).
5 Push a new siphon tip (2) into the tip of the green tube (1).

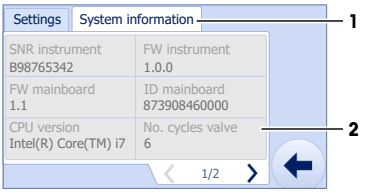


6.4 Replace the valve

The instrument permanently counts the cycles of the valve. When the life time of 5000 cycles is reached, a message box opens.

Check the number of valve cycles

1 Go to > > > **Settings**.
2 Tap **System information** (1).
⇨ The current number of valve cycles is displayed in **No. cycles valve** (2).

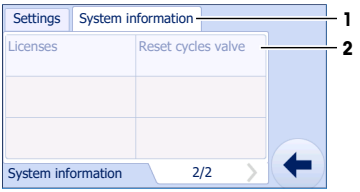


Replace the valve

1 Remove the valve. **See** [Remove the valve ▸ Page 25].
2 Clean the outlet of the valve compartment. **See** [Clean outlet of valve compartment ▸ Page 26].
3 Install the new valve. **See** [Install the valve ▸ Page 26].

Reset the number of valve cycles

1 Go to > > > **Settings**.
2 Tap **System information** (1).
3 Go to page 2.
4 Tap **Reset cycles valve** (2).
⇨ The number of valve cycles is set to 0.



6.5 Transport the instrument

- The burette, valve and tubes are rinsed and emptied.
- The instrument is disconnected from the power supply.

1 Remove all tube connectors from burette and valve.
2 Remove all cable connections from the instrument.
3 Remove the burette.
⇨ The instrument is ready to be transported.

6.6 Dispose of the instrument

In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties, the content of this regulation must also be related.

7 Technical data

Characteristic		Value
Power rating instrument	Input voltage	24 V DC
	Input current	0.5 A
Power rating AC adapter	Line voltage	100 - 240 V ±10 %
	Input frequency	50 - 60 Hz
	Input current	0.8 A
	Output voltage	24 V DC
	Output current	1.25 A
Dimensions	Width	170 mm
	Depth	220 mm
	Height	350 mm
Weight	Instrument	1850 g
Touch screen	Technology	Full-coverage touch screen
	Size	4.3 inch
	Resolution	480 x 272 pixel, color
Materials	Housing	PP GF30
	Metal parts	Stainless steel
	Touch screen cover	Polyester
Ambient conditions	Ambient temperature	5...40 °C
	Relative humidity	Max. 80 % (non condensing) at 31 °C, linearly descending to 50 % at 40 °C
	Altitude	≤2000 m above sea level
	Use	For indoor use only
	Overvoltage category	II
	Pollution degree	2

Connections

Characteristic		Value
USB type A	Data rate	USB 2.0, full / low speed
USB type B	Data rate	USB 2.0, full / low speed
Stirrer output	Voltage	0...9 V DC
	Socket	4-pin Mini-DIN
Sensor mV Input	Measuring range	± 2000 mV
	Socket	BNC
Temperature Input	Sensor type	NTC 30 KΩ at 25 °C
	Measuring range	-5...105 °C
	Socket	Cinch (RCA)

Dosing

Characteristic		Value
Burette	Size	10 mL, 20 mL, 50 mL
	Refilling time	~ 20 s
Dosing volume	Range	0.000 mL - 5,000.000 mL
Dosing time	Range	0.1s...100000s
	Resolution	0.1s
Dosing steps	Range of Volume increment	0 mL...5000 mL
	Range of number of intervals	1...100
	Range of intervals (delay time)	0.1 s...360,000.0 s

Directives and standards

The instrument complies with the directives and standards that are listed on the declaration of conformity.

EasyStir

Characteristic		Value
Stirrer motor	Motor type	24 V DC
	Voltage	0...9 V DC
	Cable connection	4-pin Mini-DIN
Materials	Housing	PP GF30
	Metal parts	Stainless steel
Weight		550 g

Easy Wheel

Characteristic		Value
USB Type C	Output voltage	5 V DC ±5 %
	Data rate	USB full / low speed
Materials	Housing	Powder coated stainless steel
	Metal parts	Aluminium alloy
Dimensions	Width	71 mm
	Length	83 mm
	Depth	58 mm
	Weight	211 g

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