Liquid Handling · Easy Handling!

BRAND

Titrette®

class A precision

F I R S T C L A S S · B R A N D

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Safety Instructions

This instrument may sometimes be used with hazardous materials, operations, and equipment. It is beyond the scope of this manual to address all of the potential safety risks associated with its use in such applications. It is the responsibility of the user of this instrument to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

⚠ Please read the following carefully!

1. Every user must read and understand this operating manual before operation.
2. Follow general instructions for hazard prevention and safety instructions; e.g., wear protective clothing, eye protection and gloves.
3. Observe the reagent manufacturers' information.
4. Never use the instrument in an atmosphere with danger of explosion.
5. Use the instrument only for titrating liquids, with strict regard to the defined limitations of use and operating limitations. Observe operating exclusions (see page 37)! If in doubt, contact the manufacturer or supplier.
6. Always use the instrument in such a way that neither the user nor any other person is endangered. Avoid splashes. Only use suitable containers.
7. Never turn handwheels when the closure cap is screwed on.
8. Never remove the titrating tube while the glass cylinder is filled.
9. Reagents can accumulate in the closure cap of the titration tube. Thus, it should be cleaned regularly.
10. For small bottles use a bottle stand to prevent tipping over.
11. An instrument mounted on a reagent bottle should never be carried by the housing. Breakage or separation of the instrument from the reagent bottle may also lead to personal injury from chemicals.
12. Never use force on the instrument.
13. Use only original manufacturer's accessories and spare parts. Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the operating manual!
14. Before use check the instrument for visible damage. If there is a sign of a potential malfunction during operation (e.g., piston difficult to move, sticking valves or leakage), immediately stop titrating. Consult the 'Troubleshooting' section of this manual (see page 64), and contact the manufacturer if needed.
15. The included 1.5 V micro-batteries are not rechargeable! Dispose of batteries only when completely discharged, and according to applicable regulations.

Functions and Limitations of Use

The bottle-top burette Titrette® with an electronic digital display is used for the titration of aqueous and non-aqueous titration media (e.g., alcoholic KOH) up to a max. concentration of 1 mol/l (see page 37 for recommended application range). It comes with a certificate of conformity according to the metrological requirements of DIN EN ISO 8655-3. Even tight Class A tolerances for glass burettes can be achieved by using a high-precision measuring system.
When the instrument is properly handled, dispensed liquid will only come into contact with the following chemically resistant materials: borosilicate glass, Al_2O_3, ETFE, PFA, FEP, PTFE, platinum-iridium; PP (screw cap). The instrument possesses a recirculation valve as the factory default.

CE Marking

This sign certifies that the product meets the requirements of the EC directive and has been tested according the specified test methods.

Functions and Limitations of Use

Storage Conditions

Store the instrument and accessories only in cleaned condition in a dry place.

Storage temperature: -20 °C to +50 °C (-4 °F to 122°F),
relative air humidity: 5% to 95%.

Operating Exclusions

Never use this instrument for

- liquids attacking borosilicate glass, Al_2O_3, ETFE, PFA, FEP, PTFE or platinum-iridium (e.g., hydrofluoric acid)
- suspensions (e.g., of charcoal) as solid particles may clog or damage the instrument
- concentrated acids and bases as well as non-polar solvents which effect swelling of plastics (e.g., Toluene, Benzene)
- Carbon disulfide, as this media is highly flammable
- The instrument must not be autoclaved!
- The instrument may not be subjected to a corrosive atmoshere.

Limitations of Use

This instrument is designed for titrating liquids, observing the following physical limits:

- +15 °C to +40 °C (59 °F to 104 °F) of instrument and reagent
- vapor pressure up to 500 mbar
- viscosity up to 500 mm^2/s
- altitude: max. 3000 m above sea-level
- relative air humidity: 20% to 90%

Operating Limitations

Chlorinated and fluorinated hydrocarbons or chemical combinations which form deposits may make the piston difficult to move or may cause jamming.

When working with crystallizing solutions follow cleaning instructions (see pages 54 - 57).

Compatibility of the instrument for this special application (e.g., trace material analysis) must be checked by the user or contact the manufacturer.

Battery Specifications

2 micro-batteries, 1.5 V (AAA/UM4/LR03), non-rechargeable.

Recommended Application Range

The instrument can be used for the following titration media (max. conc. 1 mol/l):

Reagent

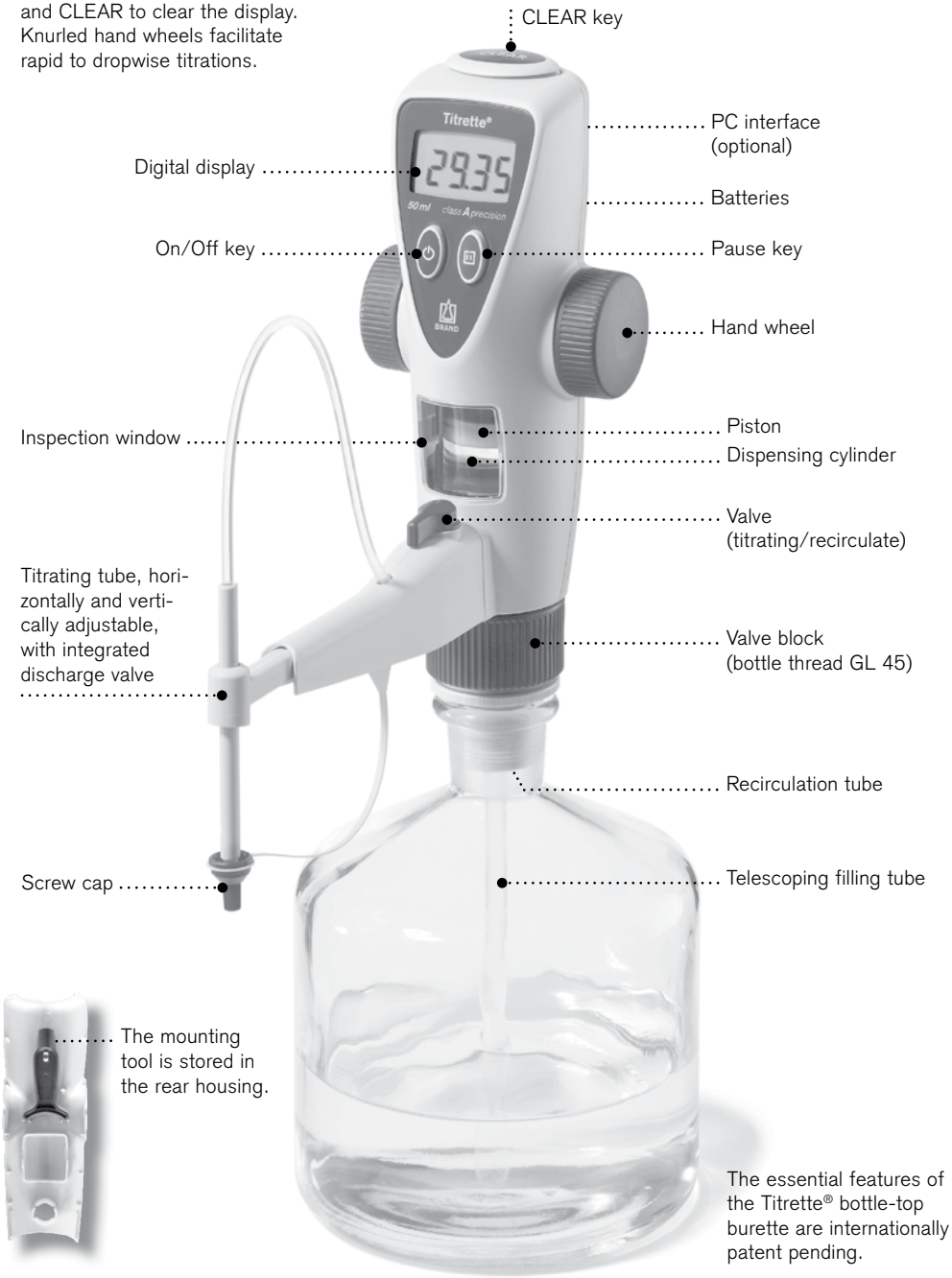
Acetic acid	Iron (II) sulfate solution	Potassium thiocyanate solution
Alcoholic potassium hydroxide solution	Nitric acid	Silver nitrate solution*
	Oxalic acid solution	Sodium arsenite solution
Ammonium iron (II) sulfate solution	Perchloric acid	Sodium carbonate solution
Ammonium thiocyanate solution	Perchloric acid in glacial acetic acid	Sodium chloride solution
Barium chloride solution		Sodium hydroxide solution
Bromide bromate solution	Potassium bromate solution	Sodium nitrite solution
Cerium (IV) sulfate solution	Potassium bromate bromide solution	Sodium thiosulfate solution
EDTA solution		Sulfuric acid
Hydrochloric acid	Potassium dichromate solution	Tetra-n-butylammonium hydroxide solution
Hydrochloric acid in Acetone	Potassium hydroxide solution	
Iodine solution*	Potassium iodate solution	Triethanolamine in Acetone*
Iodide Iodate solution*	Potassium permanganate solution*	Zinc sulfate solution

* Use light shield inspection windows (see page 44).

The above recommendations reflect testing completed prior to publication (Status as of 0511/4). Always follow instructions in the operating manual of the instrument as well as the reagent manufacturer's specifications. Should you require information on chemicals not listed, please feel free to contact BrandTech, Inc.

Operating Elements

Controls:
Separate keys for On/Off, Pause and CLEAR to clear the display. Knurled hand wheels facilitate rapid to dropwise titrations.



The mounting tool is stored in the rear housing.

The essential features of the Titrette® bottle-top burette are internationally patent pending.

Is everything in the package?

Confirm that your package includes: Titrette® bottle-top burette, size 25 ml or 50 ml; telescoping filling tube (length 170 - 330 mm); recirculation tube; 2 micro-batteries 1.5 V (AAA/UM4/LR03); 3 bottle adapters PP (45/33 mm, 45/S 40 mm, fits Stj 29/42); 2 colored light shield inspection windows; performance certificate; and this operating manual.

Initializing

1. Insert batteries

a) Unscrew the air vent cap by hand or use a coin (Fig. a).

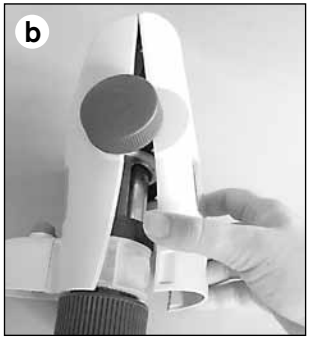
b) Remove the rear housing (Fig. b).

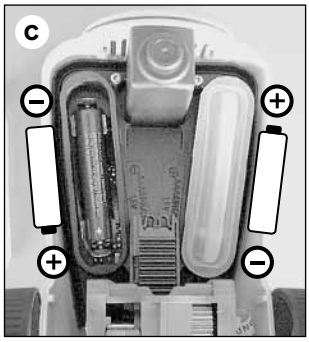
c) Remove the battery case cover and insert the batteries. Observe the correct polarity of the batteries (Fig. c).

d) Close the covers of the battery case tightly. Carefully press the edges so that the entire cover rests firmly and leaves no gap to the battery case.

e) First connect the housing at the top, then snap it closed.

f) Screw in the air vent cap.





2. Switching the instrument ON or OFF

Press the On/Off key briefly to switch the instrument on or off.

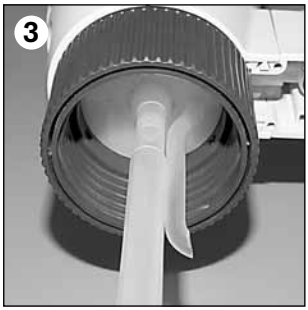
Initializing (cont.)

Attention:

Wear protective clothing, eye protection and gloves! Follow all safety instructions and observe limitations of use and operating limitations (see page 37).

3. Mounting the filling tube and recirculation tube

Adjust the length of the telescoping filling tube to the bottle height and attach it. Insert the recirculation tube with the opening pointing outward (Fig. 3).

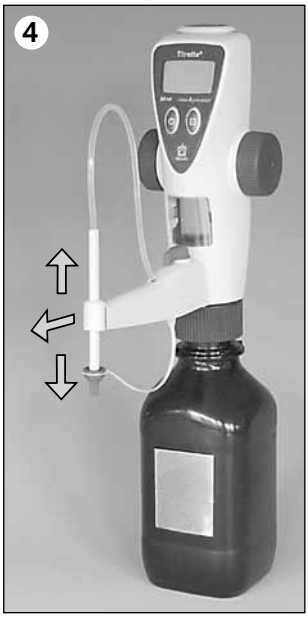


Note:

With readily crystallizing media, e.g. alcoholic KOH, the length of the telescoping filling tube should be adjusted to a distance of approx. 20 mm from the bottom of the bottle.

4. Mounting and aligning the instrument on a bottle

Screw the instrument (GL 45 thread) onto the reagent bottle and then align the titrating tube with the bottle label. For bottles with other thread sizes, select a suitable adapter. The titrating tube can be adjusted by 70 mm both horizontally and vertically (Fig. 4).



Note:

The adapters supplied with the instrument are made of polypropylene (PP), and can only be used for media which do not attack PP (see 'Accessories', page 62).

5. Transporting the instrument

When mounted to a reagent bottle, always carry the instrument as shown in the figure (Fig. 5)!

Warning!

Do not rotate the hand wheels when the valve is set to 'Titrate' and the titrating tube is closed with the screw cap.
Avoid splashing the reagent! The reagent can drip out from the titrating tube and screw cap.

Note:

Before using the instrument for the first time, ensure it is rinsed carefully and discard the first few samples dispensed. Avoid splashes.

1. Ensure that the screw cap for the titrating tube is screwed on firmly.

2. Turn the valve in the direction of the arrow to 'Recirculate' (Fig. 2).

3. First, turn the hand wheel to move the piston all the way down. For filling the piston, turn it at most half-way up, and then empty it again (Fig. 3).

Note:

If filling is not possible, see 'Troubleshooting' on page 64.

Then use a half rotation of the hand wheel to take up liquid several times, each time using a single stroke to the lower position to empty it into the bottle. Repeat this procedure 5 times until no more large bubbles are seen below the piston.

Note:

A few bubbles up to 1 mm in size are permissible.

4. Unscrew the screw cap from the titrating tube.

5. Turn the valve to 'Titrate' (Fig. 5).

6. Hold a suitable receiving vessel under the opening and dispense liquid to prime the titrating tube until it is bubble-free (Fig. 6). Wipe away any remaining drops from the titrating tube tip.

Titrating

What to do	How to do it	Keys to press	Display readout
1. Powering on the instrument	To power on the instrument, press the On/Off key.		
2. Filling the instrument	Fill the instrument smoothly up to the upper position by turning the hand wheels. Press the CLEAR key once briefly in order to set the display value to zero.		
3. Titrating	Hold a suitable receiving vessel under the opening of the titrating tube. By turning the hand wheels, deliver liquid up to the titration end point.		 (titrated volume, e.g., 28.76 ml)

Note: If the fill volume is insufficient for the entire titration, refill by gently turning back the hand wheels to the upper position (the displayed value remains unchanged during this process). Then continue with the titration.

4. Fill the instrument after titration — After titration always fill the instrument completly to the upper position.

Energy-saver mode (Auto Power Off)

When work is interrupted for more than three minutes (factory default setting), the instrument automatically switches to Standby Mode. The display value is stored at this point, and appears again in the display after switching back on manually. The time period before automatic switch to Standby can be adjusted (see page 52).

The Pause function

If air bubbles appear during titration because the instrument has not been completely primed, liquid can be dispensed into a different receptacle for priming without the display value being changed.

1. **Start the Pause function**

   Press the Pause key.
   The Pause signal blinks.

2. **Prime the instrument, dispense liquid, etc.**

   (See page 41 for description).

3. **End the Pause function**

   Press the Pause key again.
   The Pause signal then disappears.

4. **Continue the titration**

PC interface (optional)

The instrument is available with an optional RS 232 communications interface (see ordering information). The version with the interface offers the following advantages over the standard configuration:

- The titration results are automatically transmitted to the PC by double-clicking on the CLEAR key. This eliminates transcription errors while recording primary data, and complies with an important requirement of GLP.
- With each data transfer, the burette sends the titrated volume, the serial number of the instrument, the nominal volume and the adjustment value, as well as the next scheduled calibration date. Thus, all raw data is collected.

The transmitted data is recognized as keyboard inputs by the PC. This universal input format ensures that the instrument is compatible with all PC applications that accept keyboard inputs.

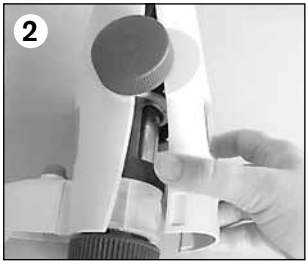
To connect the instrument to a USB interface, simply use a standard USB/RS 232 adapter.

Items supplied include a connection cable (9-pole Sub-D connector assembly) and a CD* (driver software and a public RS 232 communication protocol). All information required for integration into an existing database is available to programmers. In addition, the CD also contains a sample application in XLS format as well as an instruction manual and the testing procedure.

* German / English

Replacing the inspection window

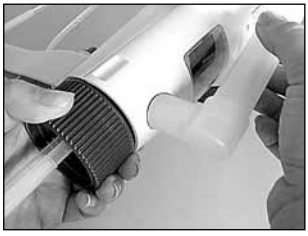
For light-sensitive media (e.g., iodine, potassium permanganate and silver nitrate solutions), we recommend the use of the colored light shield inspection window.



1. Unscrew the air vent cap by hand or use a coin (Fig. 1).
2. Remove the rear housing (Fig. 2).
3. Unclip the rear inspection window on one side and push it out (Fig. 3).
4. Place the colored inspection window with the smaller curvature into the rear housing.
5. To change the front inspection window, lift up one corner of the window, e.g., with a fingernail, and pull it out (Fig. 5).
6. Place the colored inspection window with the larger curvature in the front casing.
7. First connect the housing at the top, then snap it closed. Screw in the air vent cap to secure the back housing.

Installing a drying tube (optional)

Use of a drying tube might be necessary for moisture- and CO_2- sensitive media (see 'Accessories', page 62).



1. Unscrew the air vent cap (see above).
2. Fill the drying tube with a suitable absorbent (purchased separately), and mount this in place of the air vent cap.

Note:

If necessary, seal the threads of the drying tube, the bottle and/or the thread adapter with PTFE tape.

Error Limits

Error limits related to the nominal capacity (= maximum volume) indicated on the instrument, obtained when instrument and distilled water are equilibrated at ambient temperature (20 °C/68 °F). Testing takes place according DIN EN ISO 8655-6 with a completely filled instrument and with uniform and smooth dispensing up to the nominal or partial volume.

Comparison of error limits:

		Titrette® bottle-top burette				**Requirements for piston burettes according to DIN EN ISO 8655-3**				**Glass burette Class A acc. to DIN EN ISO 385**
Volume ml	**Partial volume ml**	**A*** ≤± %	µl	**CV*** ≤ %	µl	**A*** ≤± %	µl	**CV*** ≤ %	µl	**EL**** ± µl
25	25	0.07	18	0.025	6	0.2	50	0.1	25	30
	12.5	0.14	18	0.05	6	0.4	50	0.2	25	30
	2.5	0.70	18	0.25	6	2	50	1	25	30
50	50	0.06	30	0.02	10	0.2	100	0.1	50	50
	25	0.12	30	0.04	10	0.4	100	0.2	50	50
	5	0.60	30	0.20	10	2	100	1	50	50

* A = Accuracy, CV = Coefficient of Variation ** EL = Error limits

The maximum resolution of the display

in the 25 ml instrument: 0.001 ml, and above a 20 ml titration volume is 0.01 ml;
in the 50 ml instrument: 0.002 ml, and above a 20 ml titration volume is 0.01 ml.

Note:

The maximum error limit for a single measurement can be calculated EL = A + 2 CV.
The maximum EL for 25 ml size is ±30 µl and for 50 ml size ±50 µl.

This proves that the error limits for Class A burettes per DIN EN ISO 385 are met.

Checking the Volume (Calibration)

Depending on use, we recommend that gravimetric testing of the instrument be carried out every 3-12 months. This time frame should be adjusted to correspond with individual requirements. The complete testing procedure (SOP) can be downloaded at www.brandtech.com. In addition, a simple inspection can also be carried out over shorter time spans, for example by titration against a standard. For GLP- and ISO-compliant evaluations and documentation, we recommend the EASYCAL™ calibration software from BRAND. A demo version can be downloaded from www.brandtech.com.

Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 45) is performed as follows:

1. Preparation of the instrument

Clean the burette (see 'Cleaning', page 54), fill it with distilled H_2O and then prime it carefully.

2. Check the volume

a) Dispense 5 drops into a separate receptacle and wipe off the titrating tube tip.

b) Press the CLEAR key to set the display value to 'zero'.

c) 10 dispensed amounts in 3 volume ranges (100%, 50%, 10%) are recommended.

d) Turn the hand wheels with both hands without stopping until the test volume is shown in the display. Wipe off the titrating tube tip.

e) Weigh the dispensed amount on an analytical balance. (Please follow the operating manual from the balance manufacturer.)

f) Calculate the dispensed volume. The Z factor takes account of the temperature and air buoyancy.

3. Calculation

Mean volume

x_i = Weighing results
n = Number of weighings

Z = Correction factor
(for example 1.0029 µl/mg at 20 °C, 1013 hPa)

Mean value $\overline{x} = \frac{\Sigma\ x_i}{n}$

Mean volume $\overline{V} = \overline{x} \cdot Z$

Accuracy*

$$\mathbf{A\%} = \frac{\overline{V} - V_0}{V_0} \cdot 100$$

V_0 = Nominal volume

Standard Deviation

$$\mathbf{s} = Z \cdot \sqrt{\frac{\Sigma\ (x_i - \overline{x})^2}{n - 1}}$$

Coefficient of Variation*

$$\mathbf{CV\%} = \frac{100\ s}{\overline{V}}$$

* Calculation of accuracy (A %) and coefficient of variation (CV %):
A % and CV % are calculated according to the formulas for statistical control.

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An adjustment might be necessary after a long period of usage or following the replacement of the piston/cylinder assembly, in order to balance out differences in accuracy up to a maximum of ±0.999 ml. A change from the factory default setting is indicated by the small 'CAL' icon at the top of the display.

What to do	How to do it	Keys to press	Display readout
1. Computing the adjustment value	The adjustment value is the deviation of the mean volume from the nominal volume (e.g., mean volume 50.024 ml, nominal volume 50 ml. Adjustment value = 50.024 ml - 50.000 ml = 0.024 ml). (For calculating the mean volume, see 'Calibration', page 46).		
2. Bring up the CAL mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP	**> 3 s** 	
	When CAL appears in the display, release the CLEAR key. CAL blinks and the digits are displayed.		
3. Entering an adjustment value	For example, with an adjustment value of 0.024 ml, press the Pause or On/Off keys until the value has been reached.		
4. Confirming setting	Press the CLEAR key to confirm the input of the adjustment value. A change in the factory default setting will be shown by the CAL symbol now continuously being shown in the display.	**1x** 	

Note:

If the CLEAR key has not been pressed within approx. 15 seconds, the initial status will be retained.

The continuously displayed CAL symbol indicates that the factory default setting has been changed. By entering a new adjustment value, this will be added automatically to the already existing adjustment value.

What to do	How to do it	Keys to press	Display readout
1. Computing the adjustment value	The already adjusted instrument shows a new deviation of the mean volume from the nominal volume, for example, 0.017 ml. (For calculating the mean volume, see page 46).		
2. Bring up the CAL mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP	**>3 s** 	
	When CAL appears in the display, release the CLEAR key. CAL blinks and the adjustment value for the previously accepted adjustment appears.		
3. Entering an adjustment value	For example, with an adjustment value of 0.017 ml, press the Pause or On/Off keys until the value has been reached (the first keypress will set the display to zero).		
4. Confirming setting	Press the CLEAR key. The old and new adjustment values will be added automatically. A change in the adjustment will be indicated by the CAL symbol.	**1x** 	

Note:

In rare cases, the sum of the new and the former adjustment can account to zero. In this case, the factory default setting is obtained again and CAL disappears from the display.

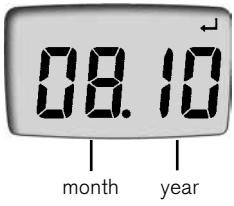
Factory Default

The continuously displayed CAL symbol indicates that the factory default setting has been changed. If you wish to restore the factory default setting, complete the following instructions.

What to do	How to do it	Keys to press	Display readout
1. Bring up the CAL mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP.	**>3 s** 	
	When CAL appears in the display, release the CLEAR key. The input symbol blinks and the adjustment value for the previously accepted adjustment appears.		
2. Restoring the factory default setting	Press the On/Off key and Pause key at the same time in order to delete the CAL symbol.		

Calibration Schedule

The schedule for the next calibration can be stored in GLP Mode (GLP = Good Laboratory Practice).

What to do	How to do it	Keys to press	Display readout
1. Bring up the GLP mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP.	>3 s 	
	When GLP appears in the display, release the CLEAR key. The input symbol blinks and 'oFF' appears.		
2. Entering the scheduled date for calibration	Press and hold the Pause key until the desired date is displayed. Pressing briefly extends the scheduled period stepwise. Pressing the On/Off key shortens the scheduled period. (Schedule input can be from 'oFF' to 12/2099)	– + 	
3. Confirming setting	Press the CLEAR key in order to confirm the input of the scheduled date for calibration.	1x 	

Note:

The stored scheduled date for calibration can be called up any time the instrument is powered on. To do this, simply press and hold the On/Off key. This brings up a continuous display of GLP, and the year and month of the desired scheduled date. Releasing the key ends the display, and the instrument will be powered on. (If 'oFF' is selected as the scheduled date for calibration, this deactivates the function.)

>2 s 

Auto Power Off

In APO mode, the time for automatic power off can be set from 1 to 30 minutes.
In factory default setting the instrument will power down automatically after 3 minutes.
The shorter the Auto Power Off setting, the longer battery service life will be.

What to do	How to do it	Keys to press	Display readout
1. Bring up the APO mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP.	**> 3 s** 	
	When APO appears in the display, release the CLEAR key. The input symbol blinks, and the factory default setting is displayed.		
2. Entering the time for automatic power off	Press the Pause or On/Off key until the desired time input value (1 - 30 min) is reached. The 'oFF' setting deactivates the automatic power off function.		
3. Confirming setting	Press the CLEAR key in order to confirm the desired power off time or to confirm 'oFF'.	**1x** 	

Note:

When the instrument powers itself off, the last displayed value will be displayed again when the instrument is powered on. If the input value 'oFF' is confirmed, the function will be deactivated and the instrument will no longer power itself off.

Changing the Decimal Place Settings

In dP mode, the display can be selectively set to show 2 or 3 decimal places (factory default setting is 2).
Note: For technical reasons, titration volumes above 20.00 ml can only be displayed to 2 decimal places.

What to do	How to do it	Keys to press	Display readout
1. Bring up the dP mode	With the instrument powered on, press and hold the CLEAR key for more than 3 seconds. The following modes will be repeatedly shown in the display after one another: CAL - GLP - APO - dP.	**> 3 s** 	
	When dP appears in the display, release the CLEAR key. The input symbol blinks, and the factory default setting is displayed.		
2. Changing the decimal place setting	Press the Pause key in order to select a display with 3 decimal places. (Pressing the key again resets to a display with 2 decimal places.)	 **1x**	
3. Confirming setting	Press the CLEAR key in order to confirm the desired decimal place display format.	**1x** 	

Cleaning

The instrument must be cleaned in the following situations to assure correct operation:

- immediately, if the hand wheels become harder than usual to turn
- before changing the reagent
- prior to long term storage
- prior to dismantling the instrument
- regularly when using crystallizing liquids
- if liquid has accumulated in the screw cap of the titration tube

Warning! The glass cylinder, valves, telescoping filling tube and titrating tube contain reagent! Follow the safety instructions (see page 36)!

Standard Cleaning

1. Hold a suitable receiving vessel below the opening of the titrating tube. Empty the instrument completely by turning the hand wheels.

2. Screw the instrument onto a bottle filled with deionized water, and set the valve to 'Titrate' (Fig. 2).

3. Place a suitable receiving vessel below the opening of the titrating tube, and rinse the instrument several times by completely filling and emptying it (Fig. 3).

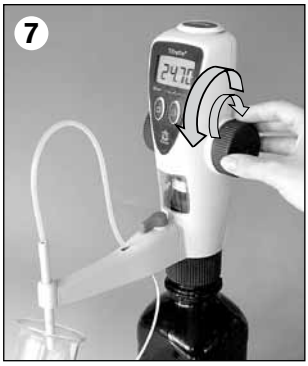
4. Set the valve to 'Recirculation' (Fig. 4), and rinse the instrument several times by completely filling and emptying it.

5. This process can optionally be repeated with a suitable cleaning agent.

6. Next, rinse again with deionized water.

7. Screw the burette onto an empty bottle. Empty the piston completely by executing several up and down motions on the instrument (Fig. 7).

8. Set the valve to 'Titrate', place a suitable receiving vessel under the titrating tube, and empty the titrating tube.



Intensive Cleaning

Warning! The dispensing cylinder, valve, telescoping filling tube and titrating tube are filled with reagent! For this reason, always perform a standard cleaning before dismantling the instrument. Follow the safety instructions (see page 36)!

In order to avoid confusion about the components, do not dismantle more than one instrument at a time. A calibration, and any necessary adjustment, must be carried out after dismantling or replacement of a piston/cylinder assembly.

1. Removing the upper part of the housing

a) Pull out the recirculation tube and the telescoping filling tube.

b) Unscrew the air vent cap by hand or use a coin.

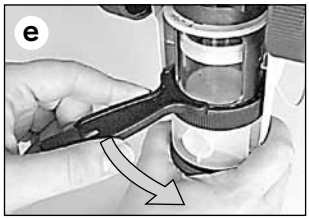
c) Remove the rear housing and take out the mounting tool.

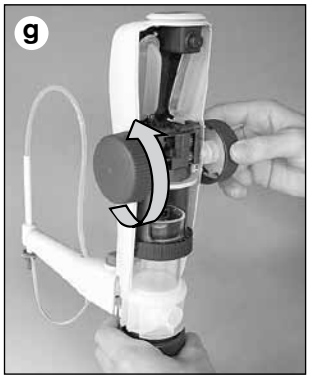
d) Move the piston all the way to the top.

e) Loosen the safety ring of the piston/cylinder assembly with the mounting tool, and unscrew it completely by hand (Fig. e).

f) Withdraw the locking mechanism of the piston rod up to the stop (Fig. f).

g) Move the top part of the instrument all the way to the top by turning the hand wheels, and remove it (Figs. g + g').

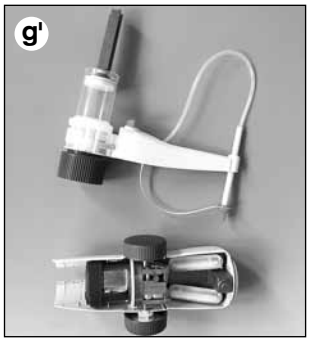




Note: **Crystallizing solutions e.g., KOH in alcohol**

After titration always fill the instrument completly to the upper position. Depending on the frequency of use, we recommend that any crystalline deposits on top of the piston be removed at regular intervals of approx. 8 weeks.

1. For this, the piston should be moved all the way up and then down by a half-rotation of the hand wheel.
2. Remove the top part of the housing.
3. Remove crystal deposits at the upper edge of the dispensing cylinder with water and a soft bottle-brush.
4. Then, dry it off with cellulose paper.
5. If necessary, dismantle it further.

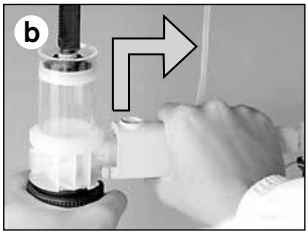


2. Removing and Cleaning / replacing titration tube

a) Set the valve to 'Recirculate' and pull the valve lever upwards (Fig. a).

b) Hold the titrating tube as shown in the figure. To disconnect the housing, press the titrating tube upwards to the stop, then use gentle up and down motions to pull it forward (Fig. b).

c) The titrating tube with integrated discharge valve should be cleaned in an ultrasonic bath, or replaced.

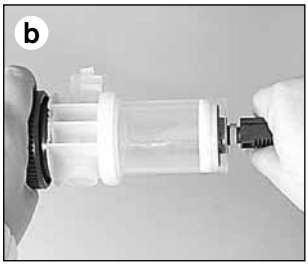


3. Cleaning / replacing the piston/cylinder assembly

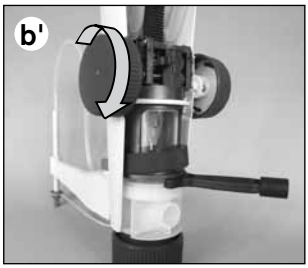
The piston/cylinder assembly consists of a piston and a dispensing cylinder with a valve block. If liquid is above the piston, then the piston should be replaced. We always recommend to replace the complete piston/cylinder assembly.

a) Remove possible crystal deposits at the upper edge of the dispensing cylinder with water and a soft bottle-brush.

b) Hold the piston rod and slowly pull the piston out from the dispensing cylinder (Fig. b).



Note: If it is difficult to move the piston open the top of the instrument, clamp the mounting tool (teeth point above) between the dispensing cylinder and the top, and turn the hand wheel to move the piston completely out of the dispensing cylinder (Fig. b').



c) Use a soft cloth to clean the dispensing cylinder and piston, or replace them.

d) To replace the piston, first slide the light grey safety ring of the piston rod upwards (Fig. d), and then unscrew the piston head (Fig. d').

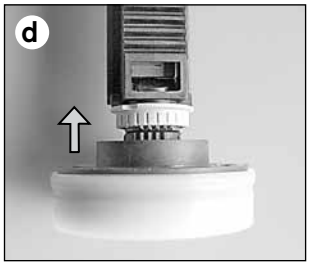
e) Screw a new piston onto the piston rod, and tighten it securely.

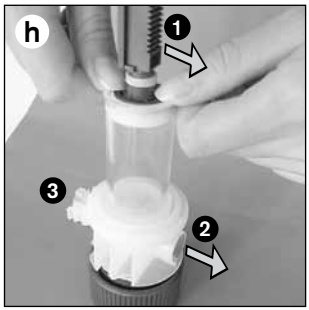
f) Line up the piston head gears and those of the piston rod, turning the piston back a maximum of half a gear tooth to accomplish this (Fig. d).

g) Slide the safety ring of the piston rod **downwards**.

h) Orient the toothed rack (1) of the piston rod in the direction of the air vent opening (2) of the valve block. This is found opposite the titrating tube connection (3). Carefully insert the piston vertically into the cleaned or replaced dispensing cylinder and press it about half-way in (Fig. h).

Note: The sealing lip of the piston must not be damaged. Contact with hard objects should be avoided!

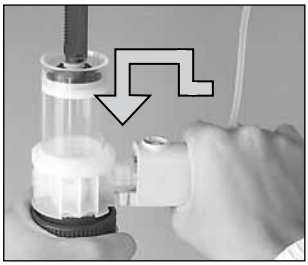




4. Mounting the titrating tube

Mounting the cleaned or replaced titrating tube

1.) Push in the titrating tube approx. 5 mm.
2.) Slide up the housing of the titrating tube to the upper stop.
3.) Push the titrating tube in completely.
4.) Slide the titrating tube housing down to lock into place.

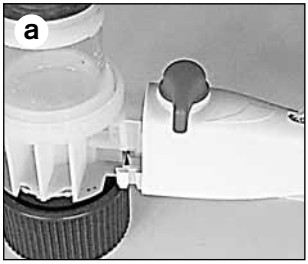


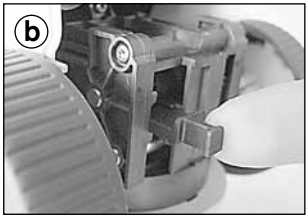
5. Mounting the top part of the housing

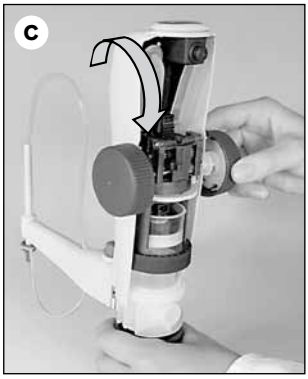
a) Pull up the valve lever to the 'Recirculate' position, and press it in tightly (Fig. a).

b) Check that the piston rod bar has been pulled out (Fig. b).

c) Attach the top part of the instrument, and rotate the hand wheels to move it down while being careful that the recess of the front casing slides snugly over the titrating tube.
Rotate the top part slightly if necessary (Fig. c).

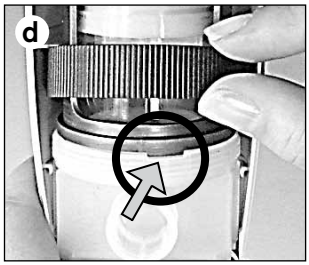






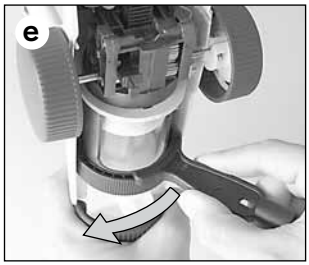
(Continued on next page)

d) Lift the safety ring of the piston/cylinder assembly and check that the nut and bolt mesh securely. Then, screw in the safety ring hand tight (Fig. d).



e) Set the mounting tool on the right-hand edge of the housing, and tighten it towards the left-hand edge (Fig. e).

Replace the mounting tool into the rear housing for storage.



f) Slide in the piston rod locking mechanism to the stop.

g) Connect the rear housing firstly at the top, then snap it closed and screw in the air vent cap.

h) Carry out a function check and calibration, and make any necessary adjustments.

6. Cleaning / replacing the filling valve

Always perform a standard cleaning before dismantling the instrument!

a) Remove the rear housing and take out the mounting tool.

b) Pull out the telescoping filling tube and the recirculation tube (Fig. b).

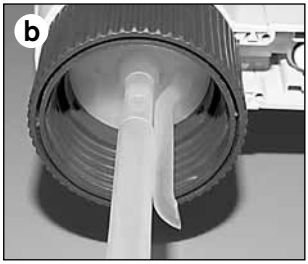
c) Use the mounting tool to unscrew the filling valve (Fig. c).

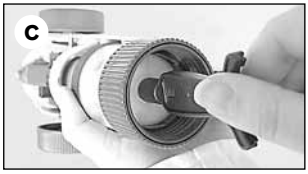
d) If the sealing ring is contaminated or damaged, carefully remove it with a pair of curved forceps (Fig. d).

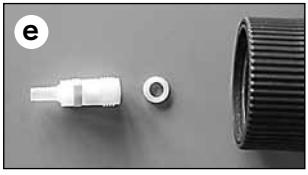
e) Clean the filling valve and sealing ring in an ultrasonic bath, or replace them (Fig. e).

f) Insert the cleaned or new sealing ring, if necessary (as in Fig. e).

g) Screw in the filling valve first by hand (Fig. g) and then tighten it with the mounting tool (1/4 turn is sufficient).







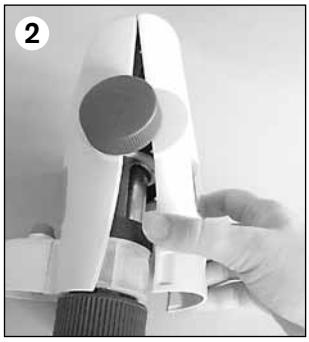
Note: If the instrument does not fill up, and if some elastic resistance is evident when the piston is rotated upward, then it is possible that the ball valve is merely stuck.
In this case, loosen the ball valve using light pressure, for example, with a 200 µl plastic pipette tip (see the figure at the side).

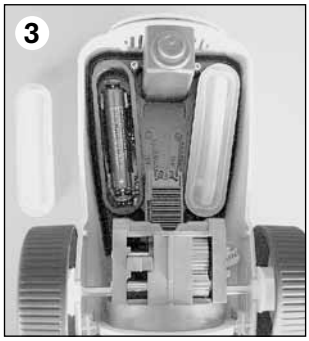
Replacing Batteries

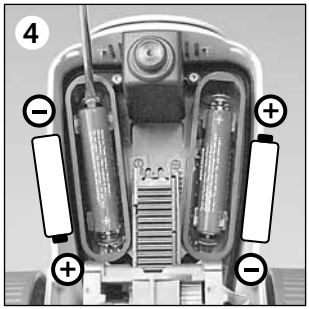
Replacing the batteries

A blinking battery symbol will show on the display if the battery capacity is depleted. The batteries should then be replaced.
Use only the specified battery type: 1.5 V (AAA/UM4/LR03) micro-battery. Batteries are not rechargeable.

1. Unscrew the air vent cap by hand or use a coin (Fig. 1).
2. Remove the rear housing (Fig. 2).
3. Remove the battery case cover (Fig. 3).
4. Remove the spent batteries using a screwdriver (Fig. 4).
5. Insert the new batteries and press them firmly into the holders. Observe the correct polarity of the batteries (Fig. 4).
6. Close the battery case covers tightly. Carefully press the edges of the covers.
7. Connect the housing at the top, then snap it closed and screw in the air vent cap.







Warning!

Dispose of batteries only when completely discharged, and according to applicable regulations. Do not short-circuit the batteries to discharge them – this is an explosion hazard!

Titrette®

	Standard	with RS 232 interface
Volume	**Cat. No.**	**Cat. No.**
25 ml	4761 151	4761 251
50 ml	4761 161	4761 261

Bottle adapter, PP. Pack of 1.

Outer-thread	for bottle thread/ fits ground joint	Cat. No.
33 mm	28 mm	27048 22
45 mm	33 mm	27048 28
45 mm	38 mm	27048 27
45 mm	S* 40 mm	27048 29
33 mm	STj 24/40	27048 38
33 mm	STj 29/42	27048 40

* buttress thread

Titrating tube with screw cap and integrated discharge and recirculation valve. Pack of 1.

Cat. No. 7075 26

Filling valve with olive-shaped nozzle and sealing ring. Pack of 1.

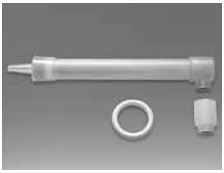
Cat. No. 6636

Screw cap with strap. Pack of 1.

Cat. No. 7075 28

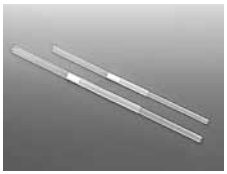
Drying tube with sealing-ring (without drying agent). Pack of 1.

Cat. No. 7079 30



Ordering Information · Accessories · Spare Parts

Telescoping filling tube, FEP. Pack of 1.



Length	Cat. No.
170 - 330 mm	7042 04
250 - 480 mm	7042 05

Recirculation tube,
pack of 1.

Cat. No. 8317

Piston,
pack of 1.

For volume	Cat. No.
25 ml	7075 30
50 ml	7075 32

Dispensing cylinder with valve block.
pack of 1.

For volume	Cat. No.
25 ml	7075 34
50 ml	7075 36

Inspection window,
one set colorless and one set brown colored (light shield).

Cat. No. 6783

Air vent cap,
pack of 1.

Cat. No. 6659

Mounting tool,
pack of 1.

Cat. No. 6784

Micro-batteries, 1.5 V
non-rechargeable (AAA/UM4/LR03).
Pack of 2.

Cat. No. 7260

For instruments with a PC interface

Connection cable RS 232
Length 2 m
pack of 1.

Cat. No. 8850

Titrette software CD-ROM
German/English
pack of 1.

Cat. No. 7075 38

Troubleshooting

Problem	Possible cause	Corrective action
Liquid is above the piston	Piston not tight	Perform a cleaning, replace the piston/cylinder assembly (see page 56).
Piston difficult to move	Piston/cylinder assembly is contaminated or damaged by crystalline deposits	Perform a cleaning, replace the piston/cylinder assembly, if necessary (see page 56).
Filling not possible	Filling valve stuck	Clean the filling valve. If the valve ball is stuck use a 200 µl plastic pipette tip to loosen it (see page 60).
Filling not possible / liquid is drawn back into the titrating tube during filling	The discharge valve is contaminated or the titrating tube has been damaged	Clean the discharge valve or exchange the titrating tube (see page 56).
Air bubbles in the instrument	Instrument filled too quickly	Fill instrument slowly
	Filling tube is loose or damaged	Fasten the telescoping filling tube firmly. If necessary, cut the tube off approx. 1 cm from the top or replace it.
	Filling valve is loose or the seal possibly has not been inserted	Check whether the seal has been inserted, and fasten the valve securely with the mounting tool.
	Filling tube does not dip into the liquid	Fill up the bottle, or correctly adjust the length of the telescoping filling tube.
	Recirculation tube is not mounted or mounted improperly	Attach the recirculation tube. The opening must point outward toward the bottle wall.
Titrating not possible	Discharge valve stuck	Clean or exchange the titrating tube with its integrated discharge valve (see page 56).
The volume delivered is smaller than that indicated	The instrument has not been completely primed	Prime the instrument again (see page 41).
	Seal might not have been inserted or the filling valve is loose	Check whether the seal has been inserted, and fasten the valve securely with the mounting tool.
	Filling valve is blocked or damaged	Clean, and if necessary replace the filling valve (see page 60).
The instrument doesn't indicate any function	Internal error	Perform a restart: remove the batteries, wait 1 minute and then replace them (see page 61).

Repairs and Warranty

If a problem cannot be fixed by following the troubleshooting guide, or by replacing spare parts, then the instrument must be sent in for repair.

For safety reasons, instruments returned for checks and repairs must be clean and decontaminated!

Return for Repair

Important! Transporting of hazardous materials without a permit is a violation of federal law.

BrandTech Scientific, Inc. will not accept instruments that are not appropriately cleaned and decontaminated.

Therefore contact BrandTech Scientific, Inc. and obtain return authorization **before** sending you instrument for service.

Return the instrument, with the Return Authorization Number prominently displayed on the outside of the package to the address provided with the Return Authorization Number. Include an exact description of the type of malfunction and the media used.

Warranty

We shall not be liable for the consequences of improper handling, use, servicing, operation or unauthorized repairs of the instrument or the consequences of normal wear and tear especially of wearing parts such as pistons, seals, valves and the breakage of glass as well as the failure to follow the instructions of the operating manual. We are not liable for damage resulting from any actions not described in the operating manual or if non-original parts have been used. For length of warranty period please see our warranty card enclosed with the product.

Disposal

The adjoining symbol means that storage batteries and electronic devices must be disposed of separately from household trash (mixed municipal waste) at the end of their service life.

- According to the Directive 2002/96/EC of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE) of 27 January 2003, electronic equipment requires disposal according to the relevant national disposal regulations.
- Batteries contain substances that can have harmful effects on the environment and human health. Therefore according to the Directive 2006/66/EC of the European Parliament and the Council on Waste Batteries of 6 September 2006 batteries require disposal according to the relevant national disposal regulations. Dispose of batteries only when completely discharged.

Warning! Do not short-circuit the battery to discharge it!