

Dispensette® S  
Dispensette® S Organic



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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!

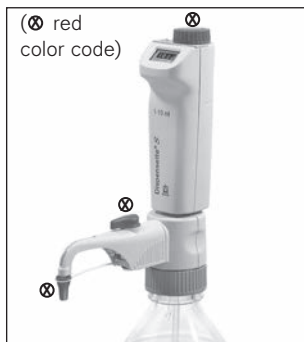
1. Every user must read and understand this operating manual before operation.
2. Follow general instructions for hazard prevention and safety instructions; e.g., wear protective clothing, eye protection and gloves.
3. Observe all specifications provided by reagent manufacturers.
4. When dispensing inflammable media, make sure to avoid the buildup of static charge, e.g., do not dispense into plastic vessels; do not wipe instruments with a dry cloth.
5. Use the instrument only for dispensing liquids, with strict regard to the defined limitations of use and operating limitations. Observe operating exclusions (see page 36)! 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. When dispensing, the discharge tube must always point away from you or any other person. Avoid splashes. Only use suitable vessels.
7. Never press down the piston when the discharge tube closure is attached.
8. Never remove the discharge tube or the recirculation valve while the dispensing cylinder is filled.
9. Reagents can accumulate in the screw cap of the discharge tube. Thus, the screw cap should be cleaned regularly.
10. For small bottles, and when using the flexible discharge tube, use a bottle stand to prevent tipping over.
11. Never carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may also lead to personal injury from chemicals (see page 41, Fig. 3).
12. Never use force on the instrument. Use smooth gentle movements to operate the piston upwards and downwards.
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. Always check the instrument for visible damage before use. If there is a sign of a potential malfunction (e.g., piston difficult to move, sticking valves or leakage), immediately stop dispensing. Consult the 'Troubleshooting' section of this manual (see page 59), and contact the manufacturer if needed.

## Functions and Limitations of Use

With the Dispensette® S and Dispensette® S Organic bottle-top dispensers, liquids can be dispensed directly from the supply bottle. Available in digital, analog and fixed models.

The instruments are marked DE-M and optionally equipped with recirculation valve.

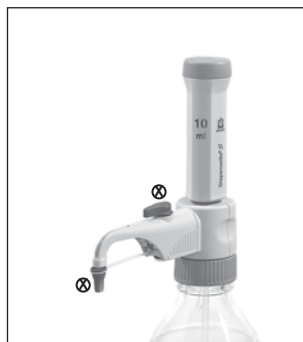
## Dispensette® S (red color code)



Digital



Analog-adjustable



Fixed-volume

## Dispensette® S Organic (yellow color code)



Digital



Analog-adjustable



Fixed-volume

When the instrument is correctly used, the dispensed liquid comes into contact with only the following chemically resistant materials:

### Dispensette® S

Borosilicate glass,  $\text{Al}_2\text{O}_3$ -ceramic, ETFE, FEP, PFA, PTFE, platinum-iridium, PP (screw cap).

### Dispensette® S Organic

Borosilicate glass,  $\text{Al}_2\text{O}_3$ -ceramic, ETFE, FEP, PFA, PTFE, tantalum, PP (screw cap).

### Note:

For dispensing hydrofluoric acid, we recommend the use of the Dispensette® S Trace Analysis bottle-top dispenser with platinum-iridium valve spring (see separate operating manual).

Alternatively ETFE/PTFE bottle adapters can be used („Accessories“, page 56). The suitability of ETFE/PTFE bottle adapters must be checked by the user.

# Functions and Limitations of Use

## Limitations of Use

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

- use temperature from +15 °C to +40 °C (from 59 °F to 104 °F) of instrument and reagent
- vapor pressure up to max. 600 mbar. Aspirate slowly above 300 mbar, in order to prevent the liquid from boiling.
- kinematic viscosity up to 500 mm<sup>2</sup>/s  
(dynamic viscosity [mPas] = kinematic viscosity [mm<sup>2</sup>/s] x density [g/cm<sup>3</sup>])
- Density up to 2.2 g/cm<sup>3</sup>

## Operating Limitations

Liquids, which form deposits may make the piston difficult to move or may cause jamming (e.g., crystallizing solutions or concentrated alkaline solutions). If the piston movement becomes sluggish or stiff, the instrument should be cleaned immediately (page 49).

When dispensing inflammable media, make sure to avoid to buildup of static charge, e.g., do not dispense into plastic vessels; do not wipe instruments with a dry cloth.

Dispensette® S is designed for general laboratory applications and complies with the relevant standards, e.g. DIN EN ISO 8655. Compatibility of the instrument for a specific application (e.g., trace material analysis, food sector etc.) must be checked by the user. Approvals for specific applications, e.g. for production and administration of food, pharmaceuticals or cosmetics are not available.

## Operating Exclusions

**Dispensette® S** never use with:

- liquids attacking Al<sub>2</sub>O<sub>3</sub>-ceramic, ETFE, FEP, PFA and PTFE (e.g., dissolved sodium azide\*)
- liquids attacking borosilicate glass (e.g., hydrofluoric acid)
- liquids which are decomposed catalytically by platinum-iridium (e.g., H<sub>2</sub>O<sub>2</sub>)
- hydrochloric acid > 20 % and nitric acid > 30 %
- tetrahydrofuran
- trifluoroacetic acid
- explosive liquids (e.g., carbon disulfide)
- suspensions (e.g., of charcoal) as solid particles may clog or damage the instrument
- liquids attacking PP (screw cap)\*\*

**Dispensette® S Organic** never use with:

- liquids attacking Al<sub>2</sub>O<sub>3</sub>-ceramic, tantalum, ETFE, FEP, PFA and PTFE (e.g., dissolved sodium azide\*)
- liquids attacking borosilicate glass (e.g., hydrofluoric acid)
- bases and saline solutions
- explosive liquids (e.g., carbon disulfide)
- suspensions (e.g., of charcoal) as solid particles may clog or damage the instrument
- liquids attacking PP (screw cap)\*\*

\* Dissolved sodium azide permitted up to a concentration of max. 0.1%.

\*\* Alternatively ETFE/PTFE bottle adapters can be used ('Accessories', page 56). The suitability of ETFE/PTFE bottle adapters must be checked by the user.

### Storage Conditions

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

Storage temperature: from -20 °C to +50 °C (from -4 °F to 122 °F).

### Recommended Application Range

**Dispensette® S:** Its broad range of application permits bottle dispensing of aggressive reagents, including concentrated acids such as  $\text{H}_3\text{PO}_4$ ,  $\text{H}_2\text{SO}_4$ , bases like NaOH, KOH, saline solutions, as well as many organic solvents.

**Dispensette® S Organic** is ideal for dispensing of organic solvents including chlorinated and fluorinated hydrocarbons (e.g., trichlorotrifluoroethane and dichloromethane), concentrated acids (e.g., HCl and  $\text{HNO}_3$ ), trifluoroacetic acid (TFA), tetrahydrofuran (THF) and peroxides.

### Note:

For guidelines on selecting the right dispenser observe the corresponding Operating Exclusions and the 'Dispenser selection chart' on the next page.

For dispensing hydrofluoric acid, we recommend the use of the Dispensette® S Trace Analysis bottle-top dispenser with platinum-iridium valve spring (see separate operating manual).

# Dispenser Selection Chart

Reagent	Disp. S	Disp. S Organ
Acetaldehyde	+	+
Acetic acid (glacial), 100%	+	+
Acetic acid, ≤ 96%	+	+
Acetic anhydride		+
Acetone	+	+
Acetonitrile	+	+
Acetophenone		+
Acetyl chloride		+
Acetylacetone	+	+
Acrylic acid	+	+
Acrylonitrile	+	+
Adipic acid	+	+
Allyl alcohol	+	+
Aluminium chloride	+	
Amino acids	+	
Ammonia, ≤ 20%	+	+
Ammonia, 20-30%		+
Ammonium chloride	+	
Ammonium fluoride	+	
Ammonium sulfate	+	
n-Amyl acetate	+	+
Amyl alcohol (Pentanol)	+	+
Amyl chloride (Chloropentane)		+
Aniline	+	+
Barium chloride	+	
Benzaldehyde	+	+
Benzene (Benzol)	+	+
Benzine (Petroleum benzene) bp 70-180 °C		+
Benzoyl chloride	+	+
Benzyl alcohol	+	+
Benzylamine	+	+
Benzylchloride	+	+
Boric acid, ≤ 10%	+	+
Bromobenzene	+	+
Bromonaphthalene	+	+
Butanediol	+	+
1-Butanol	+	+
n-Butyl acetate	+	+
Butyl methyl ether	+	+
Butylamine	+	+
Butyric acid	+	+
Calcium carbonate	+	
Calcium chloride	+	
Calcium hydroxide	+	
Calcium hypochlorite	+	
Carbon tetrachloride		+
Chloro naphthalene	+	+
Chloroacetaldehyde, ≤ 45%	+	+
Chloroacetic acid	+	+
Chloroacetone	+	+
Chlorobenzene	+	+
Chlorobutane	+	+
Chloroform		+
Chlorosulfonic acid		+
Chromic acid, ≤ 50%	+	+
Chromosulfuric acid	+	
Copper sulfate	+	
Cresol		+
Cumene (Isopropyl benzene)	+	+

Reagent	Disp. S	Disp. S Organ
Cyclohexane		+
Cyclohexanone	+	+
Cyclopentane		+
Decane	+	+
1-Decanol	+	+
Dibenzyl ether	+	+
Dichloroacetic acid		+
Dichlorobenzene	+	+
Dichloroethane		+
Dichloroethylene		+
Dichloromethane	+	+
Diesel oil (Heating oil), bp 250-350 °C		+
Diethanolamine	+	+
Diethyl ether		+
Diethylamine	+	+
1,2 Diethylbenzene	+	+
Diethylene glycol	+	+
Dimethyl sulfoxide (DMSO)	+	+
Dimethylaniline	+	
Dimethylformamide (DMF)	+	+
1,4 Dioxane		+
Diphenyl ether	+	+
Essential oil		+
Ethanol	+	+
Ethanolamine	+	+
Ethyl acetate	+	+
Ethylbenzene		+
Ethylene chloride	+	
Fluoroacetic acid		+
Formaldehyde, ≤ 40%	+	
Formamide	+	+
Formic acid, ≤ 100%		+
Glycerol	+	+
Glycol (Ethylene glycol)	+	+
Glycolic acid, ≤ 50%	+	
Heating oil (Diesel oil), bp 250-350 °C		+
Heptane	+	+
Hexane		+
Hexanoic acid	+	+
Hexanol	+	+
Hydriodic acid, ≤ 57% **	+	+
Hydrobromic acid		+
Hydrochloric acid, ≤ 20%	+	+
Hydrochloric acid, 20-37% **		+
Hydrogen peroxide, ≤ 35%		+
Isoamyl alcohol	+	+
Isobutanol	+	+
Isooctane		+
Isopropanol (2-Propanol)	+	+
Isopropyl ether	+	+
Lactic acid	+	
Methanol	+	+
Methoxybenzene	+	+
Methyl benzoate	+	+
Methyl butyl ether	+	+
Methyl ethyl ketone	+	+
Methyl formate	+	+
Methyl propyl ketone	+	+

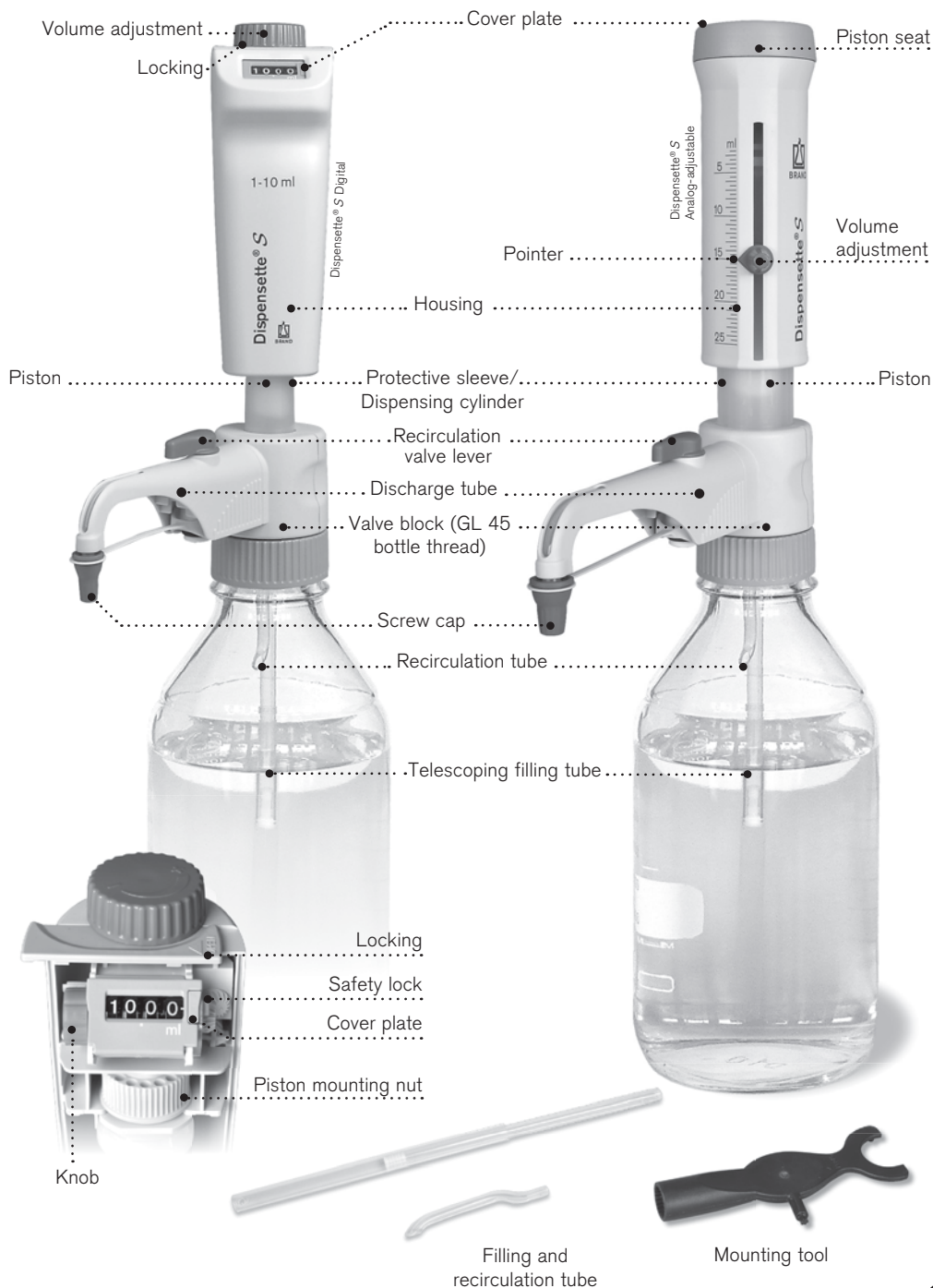
Reagent	Disp. S	Disp. S Organ
Methylene chloride		+
Mineral oil (Engine oil)	+	+
Monochloroacetic acid	+	+
Nitric acid, ≤ 30%	+	+
Nitric acid, 30-70% ***		+
Nitrobenzene	+	+
Oleic acid	+	+
Oxalic acid	+	
n-Pentane		+
Peracetic acid		+
Perchloric acid	+	+
Perchloroethylene		+
Petroleum, bp 180-220 °C		+
Petroleum ether, bp 40-70 °C		+
Phenol	+	+
Phenylethanol	+	+
Phenylhydrazine	+	+
Phosphoric acid, ≤ 85%	+	+
Phosphoric acid, 85% + Sulfuric acid, 98%, 1:1	+	+
Piperidine	+	+
Potassium chloride	+	
Potassium dichromate	+	
Potassium hydroxide	+	
Potassium permanganate	+	
Propionic acid	+	+
Propylene glycol (Propanediol)	+	+
Pyridine	+	+
Pyruvic acid	+	+
Salicylaldehyde	+	+
Scintillation fluid	+	+
Silver acetate	+	
Silver nitrate	+	
Sodium acetate	+	
Sodium chloride	+	
Sodium dichromate		
Sodium fluoride	+	
Sodium hydroxide, ≤ 30%	+	
Sodium hypochlorite	+	
Sulfuric acid, ≤ 98%	+	+
Tartaric acid	+	
Tetrachloroethylene		+
Tetrahydrofuran (THF) ***		+
Tetramethylammonium hydroxide	+	
Toluene		+
Trichloroacetic acid		+
Trichlorobenzene		+
Trichloroethane		+
Trichloroethylene		+
Trichlorotrifluoro ethane		+
Triethanolamine	+	+
Triethylene glycol	+	+
Trifluoro ethane	+	
Trifluoroacetic acid (TFA)	+	
Turpentine		+
Urea	+	
Xylene		+
Zinc chloride, ≤ 10%	+	
Zinc sulfate, ≤ 10%	+	

\* use ETFE/PTFE bottle adapter

\*\* use PTFE seal

For dispensing hydrofluoric acid, we recommend the use of the Dispensette® S Trace Analysis bottle-top dispenser with platinum-iridium valve spring (see separate operating manual).

The above recommendations reflect testing completed prior to publication. Always follow instructions in the operating manual of the instrument as well as the reagent manufacturer's specifications. In addition to these chemicals, a variety of organic and inorganic saline solutions (e.g., biological buffers), biological detergents and media for cell culture can be dispensed. Should you require information on chemicals not listed, please feel free to contact BRAND. Status as of: 0517/13





# First Steps

## Is everything in the package?

Confirm that your package includes:

Bottle-top dispenser Dispensette® S or Dispensette® S Organic, discharge tube or discharge tube with recirculation valve, telescoping filling tube, recirculation tube (included only in recirculation valve models), mounting tool, bottle adapters (listed below), a performance certificate and this operating manual.

Nominal volume, ml	Adapters for bottle thread	Filling tube Length, mm
1, 2, 5, 10	GL 24-25, GL 28/S 28, GL 32-33, GL 38, S 40	125-240
25, 50, 100	GL 32-33, GL 38, S 40	170-330

## Assembly

### Warning:

Wear protective clothing, eye protection and gloves! Follow all safety instructions and observe limitations of use and operating limitations (page 34-36).

### 1. Mounting the filling tube/ recirculation tube

Adjust the length of the telescoping filling tube to the bottle height and attach it. Center and attach the filling tube (part with smaller diameter) carefully to avoid damaging the nozzle. If a discharge tube with a recirculation valve is used, the optional recirculation tube must also be installed. Insert it with the opening pointing outward (Fig. 1).



### 2. Mounting the instrument on a bottle and alignment

Screw the instrument (GL 45 threads) onto the reagent bottle, and then align the discharge tube with the bottle label. This is done by rotating the valve block with the discharge tube (Fig. 2).

To avoid tipping over, use a bottle stand for small bottles.



**Assembly** (continued)**Note:**

For bottles with other thread sizes, select a suitable adapter.

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

Alternatively ETFE/PTFE bottle adapters can be used („Accessories“, page 56). The suitability of ETFE/PTFE bottle adapters must be checked by the user.

**Warning:**

Always wear protective gloves when touching the instrument or the bottle, especially when using dangerous liquids.

When mounted to a reagent bottle, always carry the instrument as shown in figure 3!



## Warning:

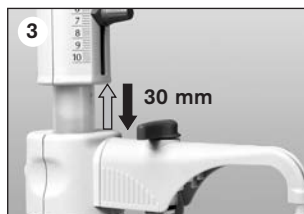
Wear protective clothing, eye protection and gloves! Never press down the piston when the screw cap is screwed on! Avoid splashing the reagent! Liquid may accumulate in the screw cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations (page 34-35).

## Note:

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

### Instruments with recirculation valve

1. Open the screw cap of the dispensing tube (Fig. 1).
2. Set valve to 'Recirculate' (Fig. 2).
3. For priming gently pull up the piston approx. 30 mm and push it down rapidly until the lower stop. Repeat this process at least 5 times (Fig. 3).
4. Turn valve to 'Dispense' (Fig. 4).
5. To avoid splashes when priming hold the discharge tube on the inner wall of a suitable receiving vessel and dispense liquid to prime the discharge tube until it is bubble-free. Wipe away any remaining drops from the discharge tube (Fig. 5).



### Instruments without recirculation valve

1. Open the screw cap of the discharge tube (see 'instrument with recirculation valve', Fig. 1).  
To avoid splashes, hold discharge tube orifice on the inner wall of a suitable receiving vessel.
2. For priming pull up the piston approx. 30 mm and push it down rapidly until the lower stop.  
Repeat this procedure approximately 3 times until the discharge tube is bubble-free (Fig. 3).

## 1. Setting the volume



**Digital:** Rotate the volume-setting wheel until the desired volume is indicated (mechanical counter).



**Analog-adjustable:** Loosen the volume selector thumb screw  $\frac{3}{4}$  turn (1), set the pointer to the desired volume (2) and then retighten the volume thumb screw (3).



**Fixed-volume:** The volume is non-adjustable and cannot be changed.

## 2. Dispensing

### Warning!

Wear protective clothing, eye protection and gloves! Never press down the piston when the screw cap is screwed on! Avoid splashing the reagent! Liquid may accumulate in the screw cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations (page 34-35).

- Remove screw cap from the discharge tube (Fig. 1).
- When using instruments equipped with the recirculation valve, turn the valve to 'Dispensing'.
- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel.
- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop (Fig. 2).
- Wipe off the discharge tube against the inner wall of the receiving vessel.
- Reattach screw cap to discharge tube (Fig. 3).



### Caution:

After using the piston, always press it down to the lower stop (parking position).

## Accessories

The following optional accessories are available:

### Flexible discharge tube with recirculation valve

For serial dispensing the flexible discharge tube can be used for the bottle-top dispenser Dispensette® S and Dispensette® S Organic ('Accessories', page 57). The specified accuracy and coefficient of variation of the instrument are only obtained for volumes > 2 ml and by gently approaching the upper and lower stops.

The coil of the tubing can be stretched to a length of the 800 mm max. The entire coil must lie in regular loops and must not be twisted.

The applicable operating exclusions are those for the corresponding instrument used.

### Assembly

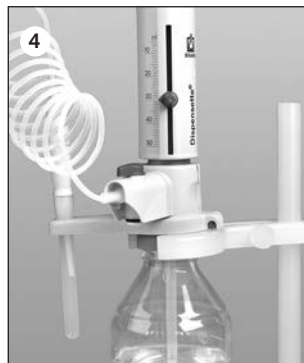
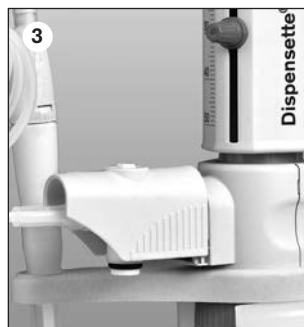
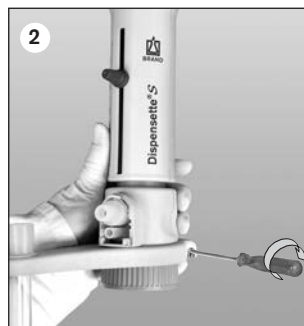
1. If the Dispensette® S was in use, the instrument must be cleaned before mounting the flexible discharge tube (see page 49).
2. Instruments with a recirculating valve should be set to 'Recirculate', and the valve lever pulled upwards to remove it.
3. Slide the discharge tube housing all the way up, then pull it forward with gentle up and down motions (Fig. 1).
4. Push the flexible discharge tube holder from the bottom of the valve block (Fig. 2) and tighten it. For this, Dispensette® S must not be mounted on the bottle. Install the receiver tube.
5. Press the plug of the recirculation valve downwards.
6. Slide the flexible discharge tube housing into the valve block up to the stop (Fig. 3).
7. Slide the discharge tube housing all the way down (Fig. 4).
8. Attach the valve handle that fits the discharge valve and press it in firmly. Note the color coding and marking (see mounting instruction 'Flexible discharge tube for Dispensette® S').

### Note:

Use a bottle stand ('Accessories', page 58).

### Warning:

There should be no visible damage to the discharge tube (e.g. kinks or the like). Each time you are going to use the tubing, examine it carefully! To dispense aggressive liquids, you should take safety measures in addition to the normal precautions. We recommend use of a protective shield. The bottle must be supported using a bottle stand. To help avoid reagent splashing from the tube, always grip the tube firmly by the handle and replace into the holder after use. For cleaning rinse the tube carefully. Do not dismantle!



## Drying tube

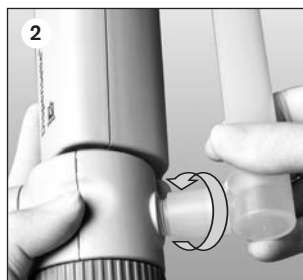
Use of a drying tube, filled with a suitable absorbent (purchased separately), might be necessary for moisture- and CO<sub>2</sub>- sensitive media ('Accessories', page 58).

### Assembly

1. Use a coin to unscrew the air vent cap (Fig. 1).
2. Screw the filled drying tube in (Fig. 2).
3. Place the PTFE sealing ring on the bottle thread (Fig. 3) and screw the instrument onto the bottle.

### Note:

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



## Sealing ring for valve block

For highly volatile media we recommend to seal the connection from valve block to bottle with the PTFE sealing ring and PTFE tape (see 'Accessories', page 58).

### Assembly

Place the PTFE sealing ring on the bottle thread or the screwed-on adapter (Fig. 3) and screw the instrument onto the bottle.

## Air vent cap for micro filter with Luer-cone

For sterile media we recommend the air vent cap with Luer-cone to attach a micro filter. This provides increased protection against contamination by displacement air (see 'Accessories', page 58).

### Assembly

1. Unscrew the air vent cap (see 'Assembly Drying tube', Fig. 1).
2. Screw in the air vent cap with a Luer cone (Fig. 1).
3. Place the PTFE sealing ring on the bottle thread and screw the instrument onto the bottle.
4. Insert a commercially available sterile filter into the Luer cone (Fig. 2).



# 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.

DE-M

20 °C  
Ex

Type Digital • Easy  
Calibration is manufac-  
tured under U.S. Patent  
5,957,330.

## Error limits

Nominal volume ml	A* ≤ ± %	μl	CV* ≤ %	μl
1	0.6	6	0.2	2
2	0.5	10	0.1	2
5	0.5	25	0.1	5
10	0.5	50	0.1	10
25	0.5	125	0.1	25
50	0.5	250	0.1	50
100	0.5	500	0.1	100

## Partial volume

The percentage values for A and CV are relative to the nominal volume (V<sub>N</sub>) and must be converted for partial volumes (V<sub>p</sub>).

$$A_T = \frac{V_N}{V_T} \cdot A_N$$

e.g.	Volume	A* ≤ ± %	μl	CV* ≤ %	μl
V <sub>N</sub>	25.0	0.5	125	0.1	25
V <sub>T</sub> = 50% N	12.5	1.0	125	0.2	25
V <sub>T</sub> = 10% N	2.5	5.0	125	1.0	25

\* A = Accuracy, CV = Coefficient of Variation

## Note:

The error limits in DIN EN ISO 8655-5 are satisfied with a significant margin. The maximum error for a single measurement is calculated from the sum of error limits EL = A + 2 × CV (e.g., for the 25 ml size: 125 μl + 2 × 25 μl = 175 μl).

## 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.brand.de](http://www.brand.de). In addition, you can also perform a function test at shorter intervals, e.g. dispensing the nominal volume into a volumetric test flask (volumetric flask with 3 marks, DAkkS calibrated). For GLP- and ISO-compliant evaluations and documentation, we recommend the EASYCAL™ calibration software from BRAND. A demo version can be downloaded from [www.brand.de](http://www.brand.de).

Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 46) is performed as follows:

### 1. Preparation of the instrument

Clean the instrument ('Cleaning', page 49-52), fill it with distilled H<sub>2</sub>O and then prime it carefully.

### 2. Check the volume

- 10 dispensing operations with distilled H<sub>2</sub>O in 3 Volume ranges (100 %, 50 %, 10 %) are recommended.
- For filling pull up the piston gently until the upper stop of the volume set.
- For discharge depress piston slowly and steadily without force until the lower stop.
- Wipe off the tip of discharge tube.
- Weigh the dispensed quantity on an analytical balance. (Please follow the operating manual of the balance manufacturer.)
- Calculate the dispensed volume. The Z factor takes account of the temperature and air buoyancy.

### 3. Calculations

#### Mean volume

$x_i$  = results of weighings  
 $n$  = number of weighings

$Z$  = correction factor  
 (e. g., 1.0029 µl/mg at 20 °C, 1013 hPa)

Mean value  $\bar{x} = \frac{\sum x_i}{n}$

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

#### Accuracy

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

$V_0$  = nominal volume

#### Standard deviation

$$s = Z \cdot \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

#### Coefficient of variation

$$CV\% = \frac{100 \cdot s}{\bar{V}}$$



# Adjustment

After a long period of usage an adjustment of the instrument might be necessary.

- Calibrate for example at nominal volume (see page 47).
- Calculate mean volume (result of weighing) (see page 47).
- Adjust the instrument (to the calculated mean volume).
- After the adjustment, further calibration is necessary to confirm appropriate adjustment.

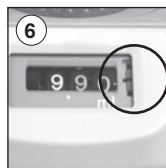
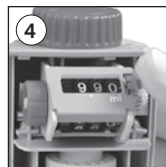
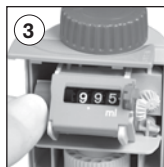
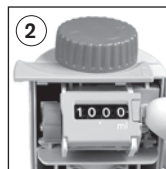
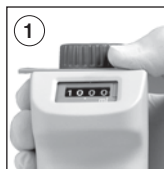
## Example:

The gravimetric check gives an actual value of 9.90 ml for a 10 ml instrument set for a nominal volume of 10.00 ml.

### Type Digital

1. Open housing by sliding the latch to the left and removing the front (Fig. 1).
2. Pull out the safety lock. The adjustment cover will then come off (Fig. 2). Discard the adjustment cover.
3. Pull the red knob to disengage the gears. Set the display to actual delivered volume (e.g., 9.90 ml) (Fig. 3).
4. First press in the red knob and then the safety lock again (Fig. 4).
5. Replace housing and slide the latch to the right (Fig. 5). Alteration of factory setting is indicated by a red recalibration flag (Fig. 6).

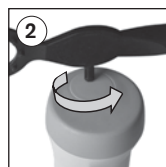
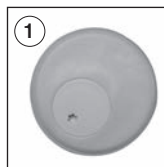
### Type Digital



### Type Analog-adjustable

1. Insert the pin of the mounting tool into the cover plate, and break it off with a rotating motion (Fig. 2). Discard the adjustment cover.
2. Insert the pin of the mounting tool into the adjustment screw (Fig. 3) and rotate to the left in order to increase the dispensing volume, or rotate to the right to decrease the dispensing volume (e.g. for an actual value of 9.97 ml, rotate approx. 1/2 turn to the left).
3. The change in the adjustment is indicated by a red disk (Fig. 4).

### Type Analog-adjustable



### Adjustment range

Nominal volume	Digital max. +/-	Analog/Fix max. +/-	One rotation corresponds to
1 ml	-	6 µl	~ 8 µl
2 ml	24 µl	12 µl	~ 16 µl
5 ml	60 µl	30 µl	~ 40 µl
10 ml	120 µl	60 µl	~ 80 µl
25 ml	300 µl	150 µl	~ 130 µl
50 ml	600 µl	300 µl	~ 265 µl
100 ml	-	600 µl	~ 400 µl

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

- immediately when the piston is difficult to move
- before changing the reagent
- prior to long term storage
- prior to dismantling the instrument
- prior to autoclaving
- prior to changing the valve
- regularly when using liquids which form deposits (e.g., crystallizing liquids)
- regularly when liquids accumulate in the screw cap

## Warning!

The cylinder, valves, telescoping filling tube and discharge tube contain reagent! Never remove the discharge tube while the dispensing cylinder is filled. Point the valves and tube openings away from your body. Wear protective clothing, eye protection and appropriate hand protection.

## Cleaning

For proper cleaning and removal of any deposits in the parts through which liquids pass, also always completely with draw the piston from the cylinder after rinsing with a suitable cleaning solution. If necessary, the parts can also be cleaned in an ultrasonic bath.

1. Screw the instrument onto an empty bottle and empty it completely by dispensing (Fig. 1). If the instrument is equipped with a recirculation valve, it must be emptied in both the 'dispense' and 'recirculate' settings.
2. Screw the instrument onto a bottle filled with a suitable cleaning agent (e.g. deionized water) and rinse the instrument several times by completely filling and emptying it.
3. Disassembly of the piston:

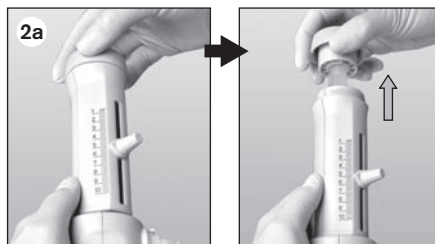


## Note:

The pistons and cylinders are individually matched, and should not be interchanged with piston from other instruments!

### a) Analog-adjusted and fixed-volume model

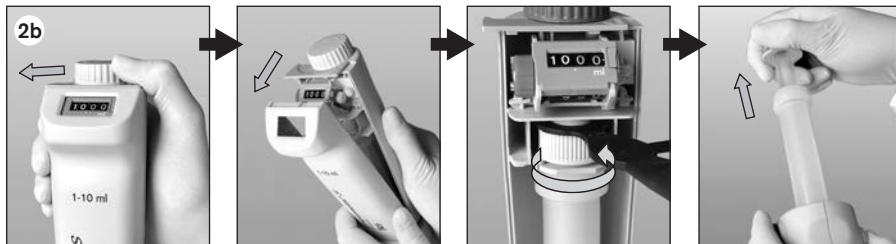
Hold the housing securely and unscrew the piston seat completely by turning it to the left. Carefully pull out the piston (Fig. 2a).



## 3. Disassembly of the piston (continued).

### b) Digital type

Carry out assembly and dismantling at the maximum volume setting (Fig. 2b).



Move the latch to the left and remove the front housing.

Place the tip of the mounting tool in the piston mounting nut, and turn the mounting tool counter-clockwise to loosen the piston mount. Then carefully pull out the piston of the cylinder.

4. Clean piston and cylinder (Fig. 3). If necessary carefully remove deposits at the edge of the glass cylinder.
5. Rinse the piston and cylinder with deionized water, and dry them carefully.
6. Insert the piston completely into the cylinder and then reassemble the instrument. The piston can only be inserted into the cylinder when the discharge tube is mounted.



#### Note:

For the Dispensette® S Organic, slide the piston into the cylinder vertically with a rotating motion.

#### Note:

#### Digital type

The stop segment must engage underneath the cylinder's stop ring.

When tightening the piston mounting nut using the mounting tool, use your thumbs to press the piston/cylinder unit back towards the back side of the housing.



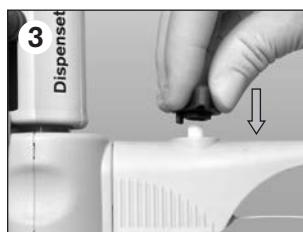
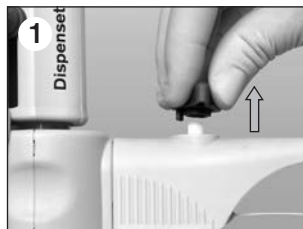
Right!



Wrong!

## Replacing the discharge tube

1. Instruments with a recirculating valve should be set to 'Recirculate', and the valve lever pulled upwards to remove (Fig. 1).
2. Slide the discharge tube housing all the way up, then pull it forward with gentle up and down motions (Fig. 2).
3. Hold coupling piece of the new discharge tube and pull housing up. Push housing into the valve block until it meets the stop.
4. Slide the discharge tube housing all the way down.
5. For instruments with a recirculation valve, pull up the valve lever to the 'Recirculate' position, and press it in tightly (Fig. 3).



## Replacing valves

### Discharge valve

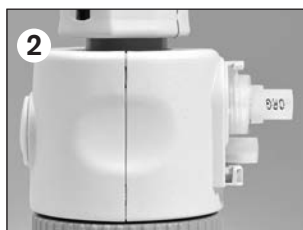
1. After disassembling the discharge tube (see 'Replacing the discharge tube' above), use the mounting tool to unscrew the discharge valve (Fig. 1).
2. Screw in the new discharge valve first by hand, then tighten it securely with the mounting tool (the threads should no longer be visible).

#### Note:

The discharge valve with a safety ball closes automatically when the discharge tube is not mounted. Attaching the discharge tube opens the safety ball again.

#### Caution:

Always install the valve intended for the particular type and size of instrument! (see page 57 for 'ordering information') Identical filling valves are used in the Dispensette® S and Dispensette® S Organic, but the discharge valves are different. For easy identification, the discharge valves for the Dispensette® S Organic are labeled with "ORG" (Fig. 2)!

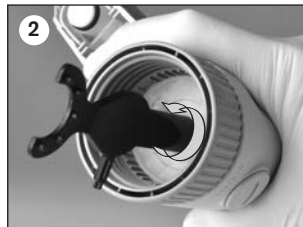
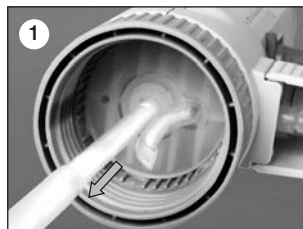


## Replacement of discharge tube/ valves

### Replacing valves (cont.)

#### Filling valve

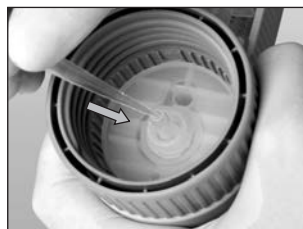
1. Pull out the recirculation tube and the telescoping filling tube (Fig. 1).
2. Use the mounting tool to unscrew the filling valve (Fig. 2).
3. Screw in the new filling valve first by hand and then tighten it with the mounting tool.



#### Note:

If the instrument does not fill up, and if some elastic resistance is evident when the piston is pulled upward, then it is possible that the ball valve is stuck.

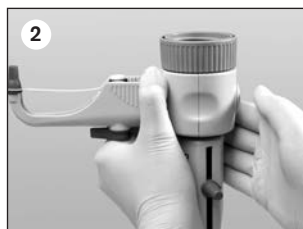
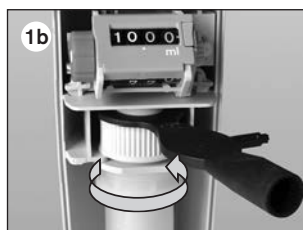
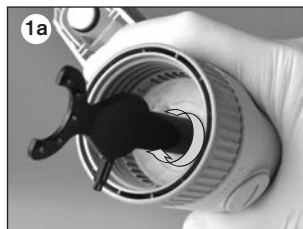
In this case, loosen the ball valve using light pressure, for example, with a 200  $\mu$ l plastic pipette tip (see the figure at the side).



The instrument can be autoclaved at 121 °C (250 °F), 2 bar with a hold time of at least 15 minutes according to DIN EN 285.

## Preparation for autoclaving

1. The instrument must be carefully cleaned prior to autoclaving (see 'Cleaning', page 49-50).
2. Open the closure cap on the discharge tube, and for instruments with a recirculation valve, set the valve to 'Dispense'.
3. Check that the filling valve is securely seated (Fig. 1a). In the digital model, additionally check that the piston mounting is securely seated (Fig. 1b).
4. To ensure unhindered access for the steam and to prevent the ball valve in the filling valve from possibly becoming stuck, hold the instrument with the discharge piston pressed vertically downward, and gently tap against the casing with your hand (Fig. 2). Then lay it horizontally in the autoclave. Be sure to avoid the instrument coming into contact with metal surfaces in the autoclave!



## Note:

Do not reassemble the instrument until it has cooled down to room temperature (Cooling time approx. 2 hours). After every autoclaving, inspect all parts for deformities or damage. If necessary, replace them.

It is the user's responsibility to ensure effective autoclaving.

## Ordering Information



### Dispensette® S, Digital

Capacity ml	Subdivision ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
0.1 - 1	0.005	4600 310	4600 311
0.2 - 2	0.01	4600 320	4600 321
0.5 - 5	0.02	4600 330	4600 331
1 - 10	0.05	4600 340	4600 341
2.5 - 25	0.1	4600 350	4600 351
5 - 50	0.2	4600 360	4600 361



### Dispensette® S, Analog-adjustable

Capacity ml	Subdivision ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
0.1 - 1	0.02	4600 100	4600 101
0.2 - 2	0.05	4600 120	4600 121
0.5 - 5	0.1	4600 130	4600 131
1 - 10	0.2	4600 140	4600 141
2.5 - 25	0.5	4600 150	4600 151
5 - 50	1.0	4600 160	4600 161
10 - 100	1.0	4600 170	4600 171



### Dispensette® S, Fixed-volume

Capacity ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
1	4600 210	4600 211
2	4600 220	4600 221
5	4600 230	4600 231
10	4600 240	4600 241
Special fixed volumes: 0.5-100 ml (please state when ordering)	4600 290	4600 291

#### Note:

Items supplied see page 40.

## Dispensette® S Organic, Digital

Capacity ml	Subdivision ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
0.5 - 5	0.02	4630 330	4630 331
1 - 10	0.05	4630 340	4630 341
2.5 - 25	0.1	4630 350	4630 351
5 - 50	0.2	4630 360	4630 361



## Dispensette® S Organic, Analog-adjustable

Capacity ml	Subdivision ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
0.5 - 5	0.1	4630 130	4630 131
1 - 10	0.2	4630 140	4630 141
2.5 - 25	0.5	4630 150	4630 151
5 - 50	1.0	4630 160	4630 161
10 - 100	1.0	4630 170	4630 171



## Dispensette® S Organic, Fixed-volume

Capacity ml	Discharge tube without recirculation valve Cat. No.	Discharge tube with recirculation valve Cat. No.
5	4630 230	4630 231
10	4630 240	4630 241
Special fixed volumes: 2-100 ml (please state when ordering)	4630 290	4630 291



### Note:

For dispensing hydrofluoric acid, we recommend the use of the Dispensette® S Trace Analysis bottle-top dispenser with platinum-iridium valve spring (see separate operating manual).





### Bottle adapters

PP or ETFE/PTFE.

Outer thread	for bottle thread/ ground joint	Material	Cat. No.
GL 32	GL 25	PP	7043 25
GL 32	GL 28/ S 28	PP	7043 28
GL 32	GL 30	PP	7043 30
GL 32	GL 45	PP	7043 45
GL 45	GL 32	PP	7043 96
GL 45	GL 35	PP	7044 31
GL 45	GL 38	PP	7043 97
GL 45	S* 40	PP	7043 43
GL 45	S* 54	PP	7044 30
GL 45	S* 60	PP	7043 48
GL 32	GL 25	ETFE	7043 75
GL 32	GL 28/ S 28	ETFE	7043 78
GL 32	GL 45	ETFE	7043 95
GL 45	GL 32	ETFE	7043 98
GL 45	GL 38	ETFE	7043 99
GL 45	S* 40	PTFE	7043 91
GL 32	NS 19/26	PP	7044 19
GL 32	NS 24/29	PP	7044 24
GL 32	NS 29/32	PP	7044 29

\* buttress thread



### Discharge tube without recirculation valve

Pack of 1.

Description	Nominal volume ml	Shape	Length mm	Cat. No.
for Dispensette® S	1, 2, 5, 10	fine tip	108	7080 02
	5, 10	standard	108	7080 05
	25, 50, 100	fine tip	135	7080 06
	25, 50, 100	standard	135	7080 08
for Dispensette® S Organic	5, 10	fine tip	108	7080 12
	5, 10	standard	108	7080 14
	25, 50, 100	fine tip	135	7080 16
	25, 50, 100	standard	135	7080 19



## Discharge tube with recirculation valve

Pack of 1.

Description	Nominal volume ml	Shape	Length mm	Cat. No.
for Dispensette® S	1, 2, 5, 10	fine tip	108	7081 02
	5, 10	standard	108	7081 04
	25, 50, 100	fine tip	135	7081 06
	25, 50, 100	standard	135	7081 09
for Dispensette® S Organic	5, 10	fine tip	108	7081 12
	5, 10	standard	108	7081 14
	25, 50, 100	fine tip	135	7081 16
	25, 50, 100	standard	135	7081 19

## Flexible discharge tubing with recirculation valve\*

for Dispensette® S and Dispensette® S Organic  
PTFE, coiled, length 800 mm, with safety handle. Pack of 1.



## Dispensette® S discharge valve

PFA/Boro 3.3/ceramic/platinum-iridium.  
No valve marking.  
Pack of 1.



Nominal volume ml	Discharge tube		Cat. No.
	Outer Ø mm	Inner Ø mm	
1, 2, 5, 10	3	2	7081 32
25, 50, 100	4,5	3	7081 34

\* not suitable for hydrofluoric acid

for nominal volume ml	Cat. No.
1, 2*	6749
5, 10	6727
25, 50, 100	6728

\* with valve marking '1 + 2'

## Dispensette® S Organic discharge valve

PFA/Boro 3.3/ceramic/tantalum. Valve marked with 'ORG'.  
Pack of 1.



## Filling valve for Dispensette® S and Dispensette® S Organic

Valve: PFA/ETFE/Boro 3.3/ceramic.  
No valve marking.  
Pack of 1.



for nominal volume ml	Cat. No.
5, 10	6729
25, 50, 100	6730

for nominal volume ml	Cat. No.
1, 2, 5, 10	6734
25, 50, 100	6735

## Accessories · Spare Parts

### Telescoping filling tubes

for Dispensette® S and Dispensette® S Organic FEP. Adjusts to various bottle heights.  
Pack of 1.



Nominal volume ml	Outer Ø mm	Length mm	Cat. No.
1, 2, 5, 10	6	70-140	7082 10
		125-240	7082 12
		195-350	7082 14
		250-480	7082 16
25, 50, 100	7,6	170-330	7082 18
		250-480	7082 20

### Air vent cap for micro filter with Luer-cone

PP. Air vent cap and PTFE-sealing ring.  
Pack of 1 each.

**Cat. No.** 7044 95



### Calibrating-, mounting-tool

for Dispensette® S and Dispensette® S Organic  
Pack of 1.

**Cat. No.** 6748



### Bottle Stand

PP. Support rod 325 mm, Base plate 220 x 160 mm.  
Pack of 1.

**Cat. No.** 7042 75



### Recirculation tube

for Dispensette® S and Dispensette® S Organic FEP. Pack of 1.

**Cat. No.** 6747



### Sealing ring for the valve block

PTFE, for highly volatile media.  
Pack of 1.

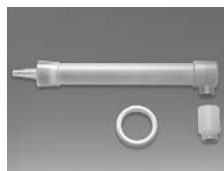
**Cat. No.** 7044 86



### Drying tube incl. PTFE-sealing ring

Drying tube and seal, without drying agent.  
Pack of 1.

**Cat. No.** 7079 30



### Screw cap with fastener

Pack of 1.



Description	Nominal volume ml	Cat. No.
PP, red, for Dispensette® S	1, 2, 5, 10	7060 18
	25, 50, 100	7060 19
PP, yellow, for Dispensette® S Organic	5, 10	7060 25
	25, 50, 100	7060 27
ETFE*, for Dispensette® S and Dispensette® S Organic	1, 2, 5, 10	7060 29
PTFE*, for Dispensette® S and Dispensette® S Organic	25, 50, 100	7060 31

Problem	Possible cause	Corrective action
Piston moves with difficulty or is stuck	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions (page 49-52).
Filling not possible	Volume adjusted to minimum setting	Set to required volume (see page 43).
	Filling valve stuck	Unscrew the filling valve from the valve block, clean it, replace the filling valve if necessary. If the valve is stuck use a 200 µl pipette tip to loosen it (see page 52). If necessary replace the filling valve.
Dispensing not possible	Discharge valve stuck	Unscrew the discharge valve from the valve block, clean it, replace the discharge valve if necessary (see page 51), use a 200 µl plastic tip to loosen any ball valve that is stuck.
Discharge tube or discharge tube with re-circulation valve cannot be mounted sufficiently	Discharge valve is not screwed in deeply enough	Tighten the discharge valve with the mounting tool until it meets the stop so that the threads are no longer visible.
Air bubbles in the instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	Valve screw connections loose	Tighten the valves firmly with the mounting tool.
	The instrument has not been primed	Prime the instrument (see page 42).
	Filling tube is loose or damaged	Push the filling tube on firmly. If necessary cut off approx. 1 cm of tube at the upper end and re-connect it or replace filling tube.
	Valves not firmly connected or damaged	Cleaning procedure (see page 49-52). Tighten the valves using the mounting tool.
Dispensed volume is too low	Filling tube is loose or damaged	Cleaning procedure (see page 49-52). Push the filling tube on firmly. If necessary, cut off approx. 1 cm of the tube at the upper end and re-connect it or replace filling tube (see page 51).
	Filling valve is loose or damaged	Cleaning procedure (see page 49-52). Tighten the valves using the mounting tool. If necessary, replace filling valves.
Leaking liquid between instrument and bottle	Recirculation tube not connected	Connect recirculation tube (see page 38, Fig. 3).
	Volatile reagent dispensed without sealing ring	Mount sealing ring (see page 45).

### Return for repair

#### Caution!

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

- Clean and decontaminate the instrument carefully.
- It is essential always to include an exact description of the type of malfunction and the media used. If information regarding media used is missing, the instrument cannot be repaired.
- Shipment is at the risk and the cost of the sender.

### Outside the U.S. and Canada:

- Complete the "Declaration on Absence of Health Hazards" and send the instrument to the manufacturer or supplier. Ask your supplier or manufacturer for the form. The form can also be downloaded from [www.brand.de](http://www.brand.de).

### In the U.S. and Canada:

- Contact BrandTech Scientific, Inc. and obtain authorization for the return **before** sending your instrument for service.
- Return only cleaned and decontaminated instruments, with the Return Authorization Number prominently displayed on the outside of the package to the address provided with the Return Authorization Number.

### Contact addresses

#### BRAND GMBH + CO KG

Otto-Schott-Straße 25  
97877 Wertheim (Germany)  
Tel.: +49 9342 808-0  
Fax: +49 9342 808-98000  
E-Mail: [info@brand.de](mailto:info@brand.de)  
[www.brand.de](http://www.brand.de)

#### USA and Canada:

BrandTech® Scientific, Inc.  
11 Bokum Road  
Essex, CT 06426-1506 (USA)  
Tel.: +1-860-767 2562  
Fax: +1-860-767 2563  
[www.brandtech.com](http://www.brandtech.com)

#### India:

BRAND Scientific Equipment Pvt. Ltd.  
303, 3rd Floor, 'C' Wing, Delphi  
Hiranandani Business Park, Powai  
Mumbai - 400 076 (India)  
Tel.: +91 22 42957790  
Fax: +91 22 42957791  
E-Mail: [info@brand.co.in](mailto:info@brand.co.in)  
[www.brand.co.in](http://www.brand.co.in)

#### China:

BRAND (Shanghai) Trading Co., Ltd.  
Guangqi Culture Plaza  
Room 506, Building B  
No. 2899, Xietu Road  
Shanghai 200030 (P.R. China)  
Tel.: +86 21 6422 2318  
Fax: +86 21 6422 2268  
E-Mail: [info@brand.cn.com](mailto:info@brand.cn.com)  
[www.brand.cn.com](http://www.brand.cn.com)

ISO 9001 and GLP-guidelines require regular examinations of your volumetric instruments. We recommend checking the volume every 3-12 months. The interval depends on the specific requirements on the instrument. For instruments frequently used or in use with aggressive media, the interval should be shorter. The detailed testing instruction can be downloaded on [www.brand.de](http://www.brand.de) or [www.brandtech.com](http://www.brandtech.com).

BRAND also offers you the possibility to have your instruments calibrated by the BRAND Calibration Service or the BRAND-owned DAkkS Calibration Service.

Just send in the instruments to be calibrated, accompanied by an indication of which kind of calibration you wish. Your instruments will be returned within a few days together with a test report (BRAND Calibration Service) or with a DAkkS Calibration Certificate. For further information, please contact your dealer or BRAND. Complete ordering information is available for download at [www.brand.de](http://www.brand.de) (see Technical Documentation).

## Warranty

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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 spare parts or components have been used.

U.S. and Canada:

Information for warranty please see [www.brandtech.com](http://www.brandtech.com).

## Disposal

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For the disposal of instruments, please observe the relevant national disposal regulations.

Subject to technical modification without notice. Errors excepted.

