Liquid Handling · Easy Handling!

BRAND

Dispensette®

FIRST CLASS · BRAND

Table of Contents

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 34)! 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 dispense into suitable vessels.
7. Never press down the piston when the discharge tube is closed with the screw cap.
8. Never remove the discharge tube or the SafetyPrime™ recirculation valve while the dispensing cylinder is filled.
9. Reagents can accumulate in the screw cap of the discharge tube. Thus, it 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 lead to personal injury from chemicals (see page 39, Fig. 6).
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 visual 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 57), and contact the manufacturer if needed.

Functions and Limitations of Use

The bottle-top dispenser Dispensette® is designed for dispensing liquids directly from the reservoir bottle. The Dispensette® is offered in three models: Dispensette® III, Dispensette® Organic and Dispensette® HF. Depending on the instrument's model the following types are available: digital, analog-adjustable and fixed-volume. The instruments are, according to the requirements of the DIN EN ISO 8655-5, conformity certified and optionally equipped with SafetyPrime™ recirculation valve.

Functions and Limitations of Use

Dispensette® III (red color code)

Digital · Easy Calibration

Analog-adjustable

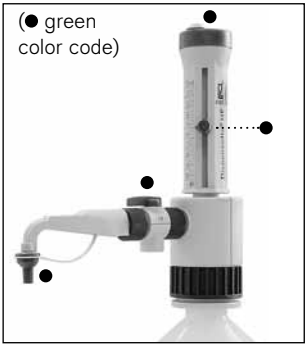
Fixed-volume

Dispensette® Organic (yellow color code)

Digital · Easy Calibration

Analog-adjustable

Dispensette® HF (green color code)



Analog-adjustable

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

Dispensette® III
Borosilicate glass, Al_2O_3-ceramic, ETFE, FEP, PFA, PTFE, platinum-iridium, PP (screw cap).

Dispensette® Organic
Borosilicate glass, Al_2O_3-ceramic, ETFE, FEP, PFA, PTFE, tantalum, PP (screw cap).

Dispensette® HF
Al_2O_3-ceramic, ETFE, FEP, PFA, PTFE, platinum-iridium, PP (screw cap).

If a higher chemical resistance is required, please use a PTFE screw cap and a EFTE/PTFE bottle adapter (Accessories, pages 54-56).

Limitations of Use

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

- +15 °C to +40 °C (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^2/s (dynamic viscosity [mPas] = kinematic viscosity [mm^2/s] x density [g/cm^3])
- Density: Dispensette® III / Dispensette® Organic: up to 2.2 g/cm^3 and Dispensette® HF up to 3.8 g/cm^3

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).
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.

The Dispensette® 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 in the medicinal / pharmaceutical / foodstuff processing areas are not available.

Operating Exclusions

Dispensette® III never use with:

- liquids attacking Al_2O_3-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_2O_2)
- 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® Organic never use with:

- liquids attacking Al_2O_3-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)

Dispensette® HF never use with:

- liquids attacking Al_2O_3-ceramic, ETFE, PFA, FEP and PTFE (e.g., dissolved sodium azide*)
- liquids which are decomposed catalytically by platinum-iridium (e.g., H_2O_2)
- 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%.

Storage Conditions

Store the instrument and accessories only in cleaned condition in a cool and dry place.
Storage temperature: -20 °C to +50 °C (-4 °F to 122 °F).

Recommended Application Range

Dispensette® III (color code red): Its broad range of application permits bottle dispensing of aggressive reagents, including concentrated acids such as H_3PO_4, H_2SO_4, bases like NaOH, KOH, saline solutions, as well as many organic solvents.

Dispensette® Organic (yellow color code) is ideal for dispensing of organic solvents including chlorinated and fluorinated hydrocarbons (e.g., trichlorotrifluoroethane and dichloromethane), concentrated acids (e.g., HCl and HNO_3), trifluoroacetic acid (TFA), tetrahydofuran (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.

Dispensette® HF (green color code) is designed to dispense hydrofluoric acid (HF) up to a concentration of max. 52 %. Always operate instrument at least once every second week when filled.

For dispensing bromine, exchange the PP screw cap of the tube closure by a PTFE screw cap and, if necessary, use an ETFE/PTFE bottle adapter. Additionally the usage of the closure set is recommended (Accessories page 56).

Dispenser Selection Chart

Reagent	Disp. III	Disp. 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 (Gasoline)		+
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. III	Disp. Organ.
Cyclohexane		+
Cyclohexanone	+	+
Cyclopentane		+
Decane	+	+
1-Decanol	+	+
Dibenzyl ether	+	+
Dichloroacetic acid		+
Dichlorobenzene	+	+
Dichloroethane		+
Dichloroethylene		+
Dichloromethane		+
Diesel oil (Heating oil)		+
Diethanolamine	+	+
Diethyl ether		+
Diethylamine	+	+
1.2 Diethylbenzene	+	+
Diethylene glycol	+	+
Dimethyl sulfoxide (DMSO)	+	+
Dimethylaniline	+	
Dimethylformamide (DMF)	+	+
1.4 Dioxane		+
Diphenyl ether	+	+
Ethanol	+	+
Ethanolamine	+	+
Ethyl acetate	+	+
Ethyl methyl ketone	+	+
Ethylbenzene		+
Ethylene chloride		+
Fluoroacetic acid		+
Formaldehyde, 40%	+	
Formamide	+	+
Formic acid, 100%		+
Glycerol	+	+
Glycol (Ethylene glycol)	+	+
Glycolic acid, 50%	+	
Heating oil (Diesel oil)		+
Heptane		+
Hexane		+
Hexanoic acid	+	+
Hexanol	+	+
Hydriodic acid	+	+
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 formate	+	+
Methyl propyl ketone	+	+
Methylene chloride		+
Mineral oil (Engine oil)	+	+

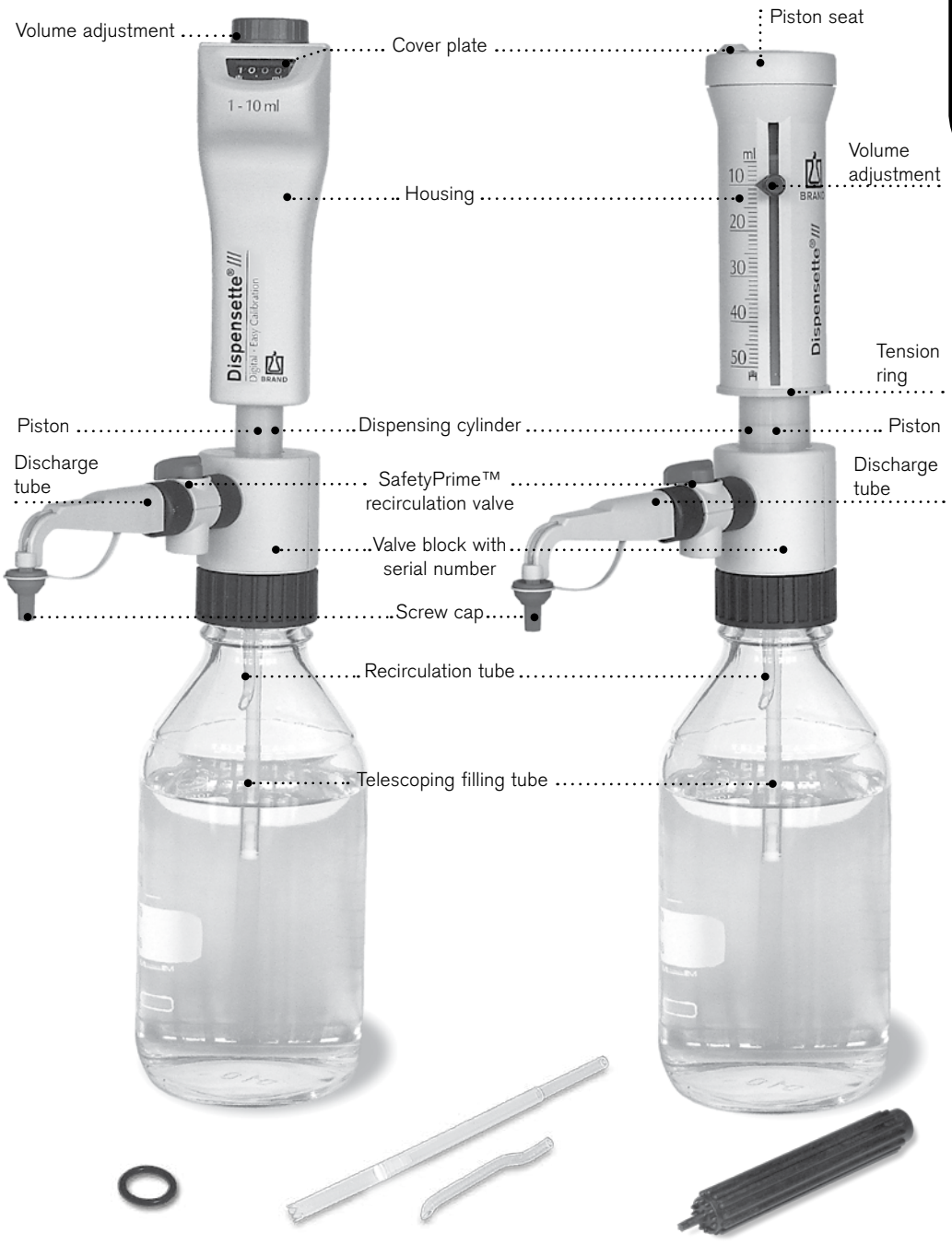
Reagent	Disp. III	Disp. Organ.
Monochloroacetic acid	+	+
Nitric acid, 30%	+	+
Nitric acid, 30-70%		+*
Nitrobenzene	+	+
Oleic acid	+	+
Oxalic acid	+	
n-Pentane		+
Peracetic acid		+
Perchloric acid	+	+
Perchloroethylene		+
Petroleum	+	+
Petroleum ether		+
Phenol	+	+
Phenylethanol	+	+
Phenylhydrazine	+	+
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	+	+
Scintilation 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

Hydrofluoric acid (HF): Only the Dispensette® HF is specifically designed to dispense hydrofluoric acid (maximum permitted concentration 52%).

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 BrandTech, Inc. Status as of: 0211/9

Operating Elements



Filling seal for autoclaving application

Filling and recirculation tube

Mounting tool

Is everything in the package?

Confirm that your package includes:
Bottle-top dispenser Dispensette®, discharge tube, telescoping filling tube, SafetyPrime™ recirculation valve and recirculation tube (optional), mounting tool, different bottle adapters, O-ring FKM (for autoclaving), a performance certificate and this operating manual.

Nominal volume, ml	Adapters for bottle thread	Filling tube Length, mm
Dispensette® III, Dispensette® Organic	**PP**	
0,5	24, 28, 33, 38 mm	125-240
1, 2, 5, 10	28, 33, 38 mm	125-240
25, 50, 100	33, 38 mm	170-330
Dispensette® HF	**ETFE/ PTFE**	
10	33 mm (ETFE), S 40 mm (PTFE)	125-240

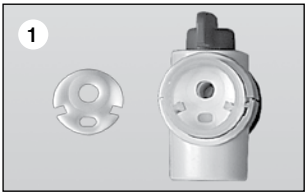
Assembly

Warning:

Wear protective clothing, eye protection and gloves! Follow all safety instructions and observe limitations of use and operating limitations (page 32-34).

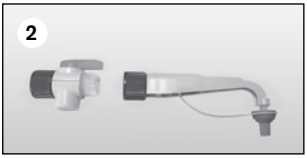
1. Check sealing washer(s)

Before mounting the SafetyPrime™ recirculation valve or the discharge tue make sure that the sealing washer is inserted.



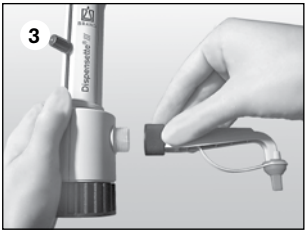
2. Mounting the SafetyPrime™ recirculation valve (optional)

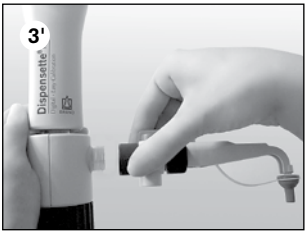
Push the SafetyPrime™ recirculation valve approx. 2 mm into the discharge tube and firmly finger-tighten the locking nut (Fig. 2). Check the SafetyPrime™ recirculation valve for a tight fit.



3. Mounting the Discharge tube

Push the discharge tube (optional with SafetyPrime™ recirculation valve, Fig. 3') approx. 2 mm into the valve block and and firmly finger-tighten the locking nut (Fig. 3). Check the discharge tube for a tight fit.



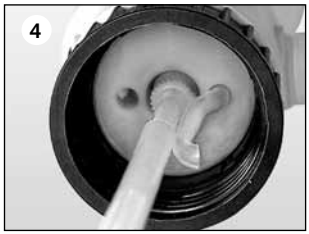


Note:

Recirculation valve and discharge tube must correspond to the model. Pay attention to the color code. After two days tighten up the locking nut.

4. Mounting the filling tube and recirculation tube

Adjust the length of the telescoping filling tube to the bottle height and attach it. If a SafetyPrime™ recirculation valve (optional) is used, the recirculation tube must also be mounted. Insert the recirculation tube with the opening pointing outward (Fig. 4).



5. Mounting and aligning the instrument on a bottle

Screw the instrument (GL 45 thread) onto the reagent bottle and then align the discharge tube with the bottle label. By turning the valve block. (Fig. 5). To prevent tipping over use a bottle stand for small bottles.

Note:

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

Dispensette® III and Dispensette® Organic:
The adapters supplied with the instrument are made of polypropylene (PP), and can only be used for media which do not attack PP.
If a higher chemical resistance is required, please use a EFTE/PTFE bottle adapter (Accessories, page 54).

Dispensette® HF:
The adapters supplied with the instrument are made of ETFE and PTFE.

6. Transporting the instrument

When mounted to a reagent bottle, always carry the instrument as shown in the figure (Fig. 6)!

Warning:

Always wear protective gloves when touching the instrument or the bottle, especially when using dangerous liquids (e.g. HF).

Warning:

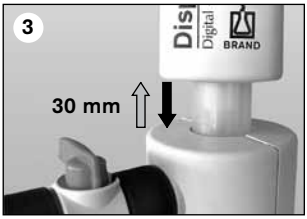
Never press down the piston when the screw cap is screwed on! Avoid splashing the reagent! The reagent can drip out from the discharge tube and screw cap.

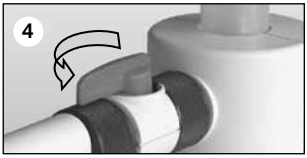
Note:

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

Instruments with SafetyPrime™ recirculation valve:

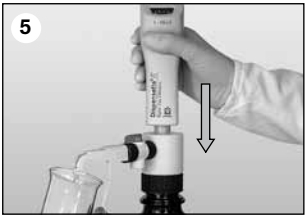
1. Open the screw cap of the dispensing tube (Fig. 1). For safety, hold the discharge tube orifice on the inner wall of a suitable receiving vessel.
2. Set valve to 'Recirculate' (Fig. 2).
3. For priming gently pull up the piston approx. 30 mm and push it down rapidly until the lower stop. Repeat this procedure 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).

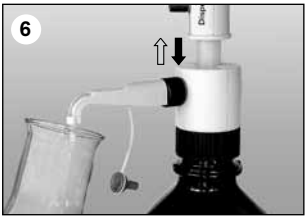




Instruments without SafetyPrime™ recirculation valve:

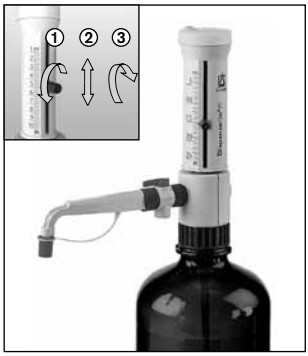
1. Open the screw cap of the discharge tube (see instrument with SafetyPrime™ recirculation valve Fig. 1).
   To avoid splashes, hold discharge tube orifice on the inner wall of a suitable receiving vessel.
2. For priming pull up the piston approx. 30 mm and push it down rapidly until the lower stop.
   Repeat this procedure approximately 5 times until the discharge tube is bubble-free (Fig. 6).





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 one-half 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! 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 32-33).

a) Remove screw cap from the discharge tube.

b) When using instruments equipped with the SafetyPrime™ recirculation valve, turn the valve to "Dispensing".

c) Hold the discharge tube orifice on the inner wall of a suitable receiving vessel.

d) Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop (Fig. d).

e) Wipe off the discharge tube against the inner wall of the receiving vessel.

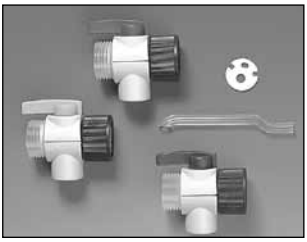
f) Reattach screw cap to discharge tube (Fig. f).

Attention:

After use, always leave the piston in the down position.

Accessories

The following optional accessories are available for the bottle-top dispenser Dispensette®:



SafetyPrime™ recirculation valve

The SafetyPrime™ recirculation valve (see accessories, page 55) enables priming of the instrument without loss of medium. Always use the designated recirculation valve that corresponds to the instrument model. For assembly, see “Assembly” on page 10 (Fig. 2).

Flexible discharge tube

For serial dispensing the flexible discharge tube can be used (Accessories page 55). 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 parts in contact with the media are made of:
Borosilicate glass, Al_2O_3-ceramic, ETFE, PTFE, platinum-iridium.
Never use for:
- liquids attacking borosilicate glass (e.g., hydrofluoric acid)
- Peroxides, as they are decomposed catalytically by platinum-iridium (e.g., H_2O_2).

Additionally the Operating Exclusions of the instrument apply.

For mounting, attach the tube holder onto the valve block (Fig. a) and mount the receiver tube. Slide the dispensing tube with the flexible discharge tube approx. 2 mm further on the valve block, and tighten the lock nut hand-tight. Use a bottle stand (Fig. b).

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!

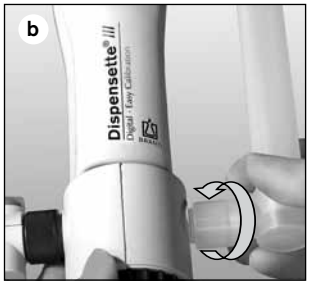
Drying tube

Use of a drying tube, filled with a suitable absorbent (purchased separately), might be necessary for moisture- and CO_2- sensitive media ('Accessories', page 56).

For mounting, unscrew the air vent cap (Fig. a) and screw the filled drying tube in (Fig. b). Place the PTFE sealing ring on the bottle thread (Fig. c) 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.



Closure set

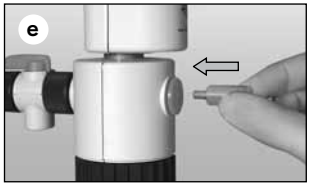
For volatile media we recommend the closure set consisting of PTFE-sealing, air vent cap and stopper with Luer-cone (see accessories, page 56).

For mounting, unscrew the air vent cap (Fig. a) and screw in the air vent cap with a Luer cone (Fig. d). Place the PTFE sealing ring on the bottle thread (Fig. c) and screw the instrument onto the bottle. During longer periods of inactivity, the air vent opening can be closed with the stopper (Fig. e). The stopper is removed for dispensing.

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 56).

For mounting, unscrew the air vent cap (Fig. a) screw in the air vent cap with a Luer cone (Fig. d). Place the PTFE sealing ring on the bottle thread (Fig. c) and screw the instrument onto the bottle. Insert a commercially available sterile filter into the Luer cone (Fig. f).



Discharge tube with Luer-Lock attachment for micro filter

The dispensing tube with a Luer Lock attachement enables the connection of a microfilter for sterile filtration. The parts which come in contact with the medium are:
Borosilicate glass, Al_2O_3-ceramic, ETFE, FEP, PFA, PTFE, platinum-iridium and PP (Luer-Lock attachment).

Never use for:
- liquids attacking borosilicate glass (e.g., hydrofluoric acid)
- Peroxides, as they are decomposed catalytically by platinum-iridium (e.g., H_2O_2).

Additionally observe the Operating Exclusions of the instrument and micro filter.
Make sure that the sealing washer is inserted.

For mounting, push the dispensing tube with the Luer Lock (optionally with the SafetyPrime™ recirculation valve) approx. 2 mm into the valve block, and firmly finger-tighten the locking nut (page 38, Figs. 3 and 3'). Check the discharge tube (eventually the SafetyPrime™ recirculation valve) for a tight fit. A commercially available sterile filter can be mounted onto the Luer Lock connector.

Note:

Please follow general instructions when handling sterile media. The increased flow resistance can lead to liquid leaking at the upper edge of the dispensing cylinder. To keep any leaking of liquid to a minimum, we recommend using gentle force when dispensing and the use of a filter with a large filter surface.

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.

Model Digital • Easy Calibration is manufactured under U.S. Patent 5,957,330.

Error limits Dispensette®

Nominal volume	A* ≤ ± %	µl	CV* ≤ %	µl
0,5	1.0	5	0.2	1
1	0.5	5	0.1	1
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

* A = Accuracy, CV = Coefficient of Variation

For the instrument with the chosen fixed volume, the values of A and CV are calculated in accordance with the nominal volume for the instrument size used.

For example
Fixed volume 42 ml, instrument size 50 ml

$$\mathbf{A\%} = \frac{50\ \text{ml}}{42\ \text{ml}} \cdot 0.5\% = 0.6\%$$

$$\mathbf{CV} = \frac{50\ \text{ml}}{42\ \text{ml}} \cdot 0.1\% = 0.12\%$$

Note:

The error limits are well within the limits of DIN EN ISO 8655-5. The maximum error limit for a single measurement can be calculated EL = A + 2 CV (e.g. for volume 10 ml: 50 µl + 2 x 10 µl = 70 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.brandtech.com. In addition, you can also carry out function checks at shorter intervals, e.g. dispensing the nominal volume into a volumetric test flask (volumetric flask with 3 marks, DKD 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.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 instrument ('Cleaning', page 48-51), fill it with distilled H_2O and then prime it carefully.

2. Check the volume

a) 10 dispensing operations with distilled H_2O in 3 Volume ranges (100 %, 50 %, 10 %) are recommended.

b) For filling pull up the piston gently until the upper stop of the volume set.

c) For discharge depress piston slowly and steadily without force until the lower stop.

d) Wipe off the tip of discharge tube.

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

f) 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 $\overline{x} = \frac{\Sigma\, x_i}{n}$

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.

After a long period of usage an adjustment of the instrument might be necessary.
- Calibrate for example at nominal volume (see page 46).
- Calculate mean volume (result of weighing) (see page 46).
- Adjust the instrument (to the calculated mean volume).
- After the adjustment, further calibration is necessary to confirm appropiate adjustment.

Example:
Gravimetric testing yields a delivered volume of 9.90 ml with a set volume of 10 ml.

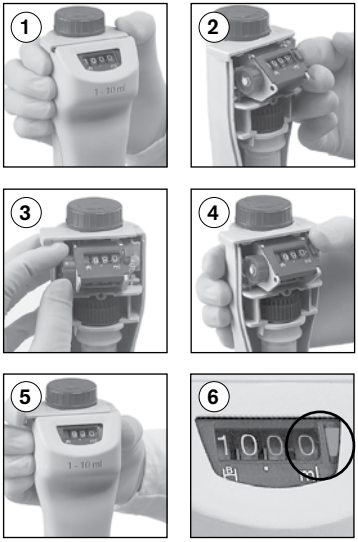
Type Digital

1. Open housing by sliding the latch to the left and removing the front (Fig. 1).
2. Lift gear lock lever to release. With this action, the adjustment cover plate breaks off (Fig. 2).
3. Pull the red knob to disengage the gears and set the display to actual delivered volume (e.g., 9.90 ml) (Fig. 3).
4. Reposition red knob and gear lock lever to their original positions (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).

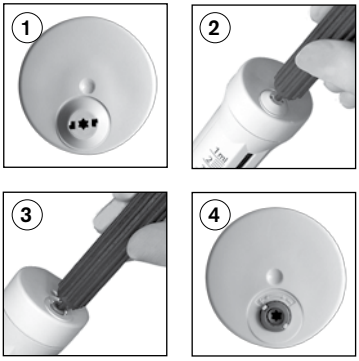
Type Analog-adjustable

1. Insert the pin of the mounting tool into the cover plate (Fig. 1), and break it off with a rotating motion (Fig. 2).
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 an exposed red ring (Fig. 4).

Digital



Type Analog-adjustable



Adjustment range

Nominal volume	Digital max. +/-	Analog/Fix max. +/-	One rotation corresponds to
0.5 ml	-	5 µl	~ 3 µl
1 ml	-	6 µl	~ 15 µl
2 ml	24 µl	12 µl	~ 15 µl
5 ml	60 µl	30 µl	~ 35 µl
10 ml	120 µl	60 µl	~ 65 µl
25 ml	300 µl	150 µl	~ 130 µl
50 ml	600 µl	300 µl	~ 265 µl
100 ml	-	600 µl	~ 400 µl

Cleaning

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 or the SafetyPrime™ recirculation valve 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, the piston must always be pulled out of the cylinder after rinsing.

1. Screw the instrument onto an empty bottle and empty it completely by dispensing (Fig. 1).If the instrument is equipped with SafetyPrime™ recirculation valve, it must be emptied in the "dispensing" and “recirculating” setting.

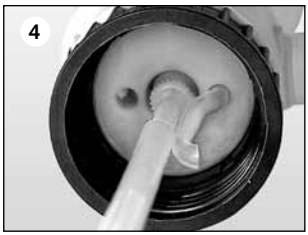
2. Screw the instrument onto a bottle filled with a suitable cleaning agent (e.g. deionized water) and rinse the instrument several times by completely filling and emptying it.

3. If the instrument is equipped with a SafetyPrime™ recirculation valve, after rinsing the instrument, it must also be rinsed in the “recirculating” setting (Fig. 3).

4. Pull out the recirculation tube and the telescoping filling tube.

Note:

Never exchange pistons between instruments!



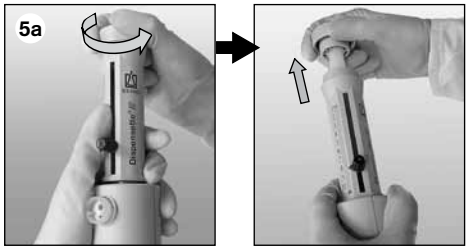
5. Loosen piston.

a) Analog-adjusted and fixed-volume model

Hold the housing securely and unscrew the piston completely by turning it to the left.

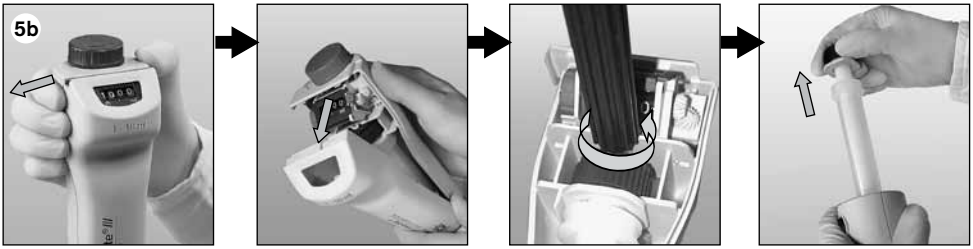
Carefully pull out the piston.

Do not remove the housing!



b) Digital type

Carry out assembly and dismantling at the maximum volume setting only.



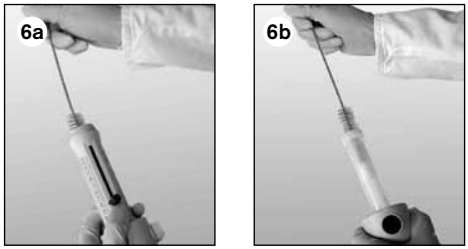
Move the latch to the left and remove the cylinder sleeve.

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

6. Clean piston and cylinder with a bottle-brush (Analog an fix type see Fig. 6a, Digital type see Fig. 6b). If necessary carefully remove deposits at the edge of the glass cylinder.

7. Then flush all parts of the instrument with deionized water.

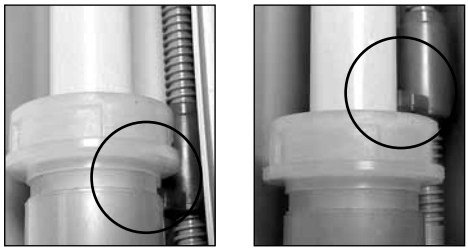
8. Insert the piston completely into the cylinder and then reassemble the instrument.



Note:

Digital type

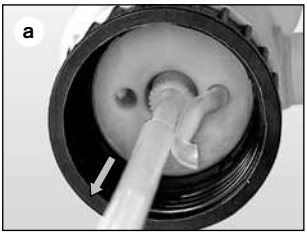
The red stop segment must engage underneath the cylinder.

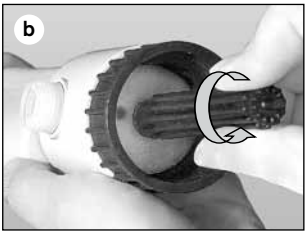


Right!
Catch is inserted **below** the cylinder.

Wrong!
Catch is inserted **above** the cylinder.

Cleaning/replacing the valves





1. Filling valve

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

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

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

d) Insert cleaned or new sealing ring.

e) Screw in the cleaned (e.g., in an ultrasonic bath) or new filling valve first by hand and then tighten it with the mounting tool.

2. Discharge valve

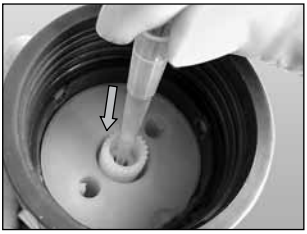
The discharge valve is incorporated in the discharge tube. For celaning see page 48. If necessary dismantle discharge tube and clean it e.g. in an ultrasonic bath. Mount cleaned or new discharge tube see page 38.

3. SafetyPrime™ recirculation valve

For celaning see page 48. If necessary dismantle recirculation volve and clean it e.g. in an ultrasonic bath. Mount cleaned or new recirculation valve see page 38.

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 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).



Autoclaving

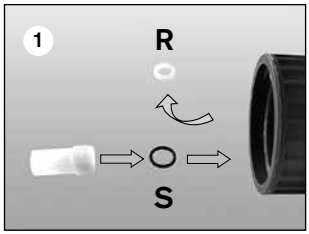
This instrument is autoclavable at 121 °C (250 °F), 2 bar absolute (30 psi) with a holding time of at least 15 minutes according to DIN EN 285. Before autoclaving, the instrument must be cleaned carefully (page 48-50). Lift the piston out of the cylinder (page 49). For autoclaving with mounted filling tube, the filling valve with olive-shaped nozzle is recommended (page 55).

1. Prior to the first autoclaving

Remove built-in inelastic PTFE-ring (R) and replace with the supplied elastic O-ring made of FKM (S).

Note:

FKM has limited chemical resistance!



R = seal **S** = elastic O-ring

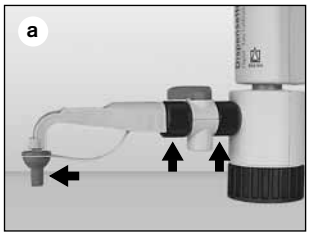
2. Autoclaving

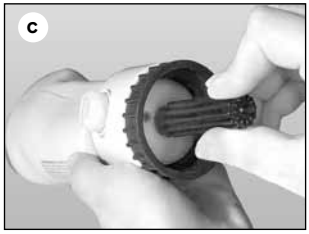
a) Loosen screw connections (Fig. a).

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

c) Check that the filling valve is securely seated (Fig. c). If the rigid PFTE ring has been installed, the filling valve must also be loosened.
In the digital model, check that the piston mount is securely seated (Fig. c').

d) Autoclave the instrument with the piston pushed all the way downward, and with the filling tube and recirculation tube disconnected. Avoid contact with metallic surfaces. The mounting tool can also be autoclaved.

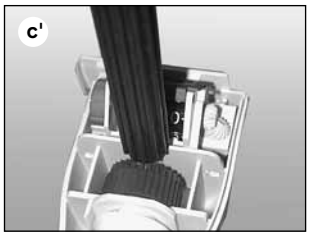




Note:

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.



Problem	Possible cause	Corrective action
Piston difficult to move	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions (page 48-50).
Filling not possible	Volume adjusted to minimum setting	Set to required volume (see page 41).
	Filling valve stuck	Clean the filling valve.If the valve is stuck use a 200 µl pipette tip to loosen it (see page 50). If necessary replace the filling valve with sealing washer.
Dispensing not possible	Discharge valve stuck	Clean discharge valve. If necessary replace discharge tube. (see page 50).
Air bubbles in the instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	Seal not inserted, knurled locking nuts not firmly connected	Double check that seal is in place, and that the knurled locking nuts at the discharge tube and the SafetyPrime™ recirculation valve are firmly seated and finger tight.
	The instrument has not been primed	Prime the instrument (see page 41).
	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 48-50). Tighten the valves using the mounting tool. If necessary, replace the valves and sealing washers.
	Backflow tube not connected	Connect backflow tube (see page 38, Fig. 3).
Dispensed volume is too low	Discharge tube is loose	Push the discharge tube on firmly.
	Filling tube is loose or damaged	Cleaning procedure (see page 48-50). 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 50).
	Filling valve is loose or damaged	Cleaning procedure (see page 48-50). Tighten the valves using the mounting tool. If necessary, replace filling valves and sealing washers.
Leaking liquid between instrument and bottle	Backflow tube not connected	Connect backflow tube (see page 38, Fig. 3).
	Volatile reagent dispensed without closure set	Mount closure set (see page 43).

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 your 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 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

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

Subject to technical modification without notice. Errors excepted.