MICROLIT

OUR REACH

YOUR SATISFACTION IS OUR PRIORITY

Established in 1991, Microlit is one of the world's leading manufacturers & exporters of laboratory liquid handling instruments. Our product range includes micropipettes, bottle top dispensers, electronic burette, electronic pipette filling device and other micropipette accessories. With our patented products, innovative technologies & unfaltering trust of 8000+ consumers in 95+ countries, we are recognized as a respected & dependable brand in Healthcare and Lifesciences industry. Our offices are located in India (HQ), USA & Brazil. With a research-oriented & customer-centric team of product design engineers, our product design blends the best of functional performance & user experience. Our innovative products have helped us carve a niche in R&D industry while providing our users high level of precision & accuracy in their research work.

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SPRING-LESS VALVE

MICROLIT LENTUS® | **Bottle Top Dispenser for** Hydrofluoric Acid

ISO 9001 ISO 13485 ISO 17025

OPERATION MANUAL

EXPERIENCE PRECISION

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1. Intended Use of the Instrument

MICROLIT LENTUS® is a Bottle Top Dispenser (BTD) which is engineered with carefully selected and tested materials for use with HYDROFLUORIC ACID (HF) and other reagents & chemicals which are compatible with it (Refer to section 6).
MICROLIT LENTUS® can precisely dispense high-purity media. When high-purity materials are dispensed with MICROLIT LENTUS® after appropriate cleaning, they release virtually no metal ions.

2. Safety Instructions

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

⚠ Please read the following instructions carefully.

- Read and understand this Operation Manual thoroughly before using the instrument.
- Follow general and safety instructions for hazard prevention. E.g., always wear protective clothing, protective gear for the eyes and hands.
- Carefully observe the specifications provided by reagent manufacturers.
- When dispensing inflammable fluids, avoid the built up of static charge. Make sure that you do not dispense into plastic vessels and do not wipe the instrument/equipment with a dry cloth.
- Use the instrument only for dispensing liquids, with strict regard to the defined limitations of use and operating constraints. (Refer to section 3 and 4)
- Observe operating exclusions. When in doubt, contact the manufacturer or supplier.
- Always use the instrument in such a way that neither the user nor any other person is in danger. While dispensing, the discharge tube must always point away from you or any other person. Only dispense into appropriate vessels and avoid splashes.
- Do not press the piston when the discharge tube closure is attached.

- Do not remove the discharge tube while the dispensing cylinder is being filled.
- Reagents can accumulate in the cap of the discharge tube. Thus, clean it regularly.
- Do not carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may lead to personal injury.
- Do not use the instrument with force. Apply smooth gentle movements to operate the piston. Use only original accessories and spare parts.
- Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the Operation Manual.
- Always check the instrument for visual damage before use.
- If there is any sign of a potential malfunction (e.g. piston difficult to move, stuck valve or leakage), immediately stop dispensing. Consult the 'Troubleshooting' section of this Operation Manual and contact the manufacturer if needed. (Refer to section 17)

3. Functions and Limitations of Use

MICROLIT LENTUS® is designed to dispense highly aggressive liquids like hydrofluoric acid directly from the reservoir bottle. It is calibrated in accordance with the guidelines of the DIN EN ISO 8655 – 5.
When the instrument is correctly used, the dispensed liquid comes into contact with only the following chemically resistant materials:
PTFE, FEP inlet and outlet tubes FEP Barrel and highest purity ceramic valve system ball & seat.

Physical limits
MICROLIT LENTUS® is designed to be operated under the following physical limits.

- Ensure that the instrument and the reagent temperature are between +15°C and +40°C (from 59°F to 104°F).
- Maintain reagent vapour pressure up to 600 mbar (maximum). Aspirate slowly above 300 mbar in order to prevent the liquid from boiling.
- Kinematic viscosity upto 500 mm^2/s.
(dynamic viscosity [mPas] = kinematic viscosity [mm^2 /s] x density [g/cm^3])
- Use fluids with density upto 3.8 g/cm^3.

Operating limitations

- Liquids, which form deposits, may make it difficult for the piston to move or jam it (like crystallizing solutions or concentrated alkaline solutions).
  If the piston becomes too difficult to move, immediately clean the instrument. (Refer to section 13)
- While dispensing inflammable fluids, avoid the built up of static charge. Make sure that you do not dispense into plastic vessels and do not wipe instruments with a dry cloth.
- MICROLIT LENTUS® is designed for general laboratory applications and complies with relevant standards, like DIN EN ISO 8655. Please check the compatibility of the instrument for a specific application. Approvals for specific applications, like production and administration of food, pharmaceuticals and cosmetics are not available.

4. Operating Exclusions

Do not use the instrument with:

- Liquids that attack FEP, PFA and PTFE (e.g. Dissolved Sodium Azide*)
- Caustic Potash, Potassium solution (Cyanide, Carbonate, Hypochlorite) & Tricresyl phosphate against ceramic.
- Zinc chloride & Zinc sulfate
- Explosive liquids (e.g. Carbon Disulfide) and Uric Acid.
- Suspensions (e.g. of charcoal) as the solid particles may clog or damage the instrument
- Liquids that attack PP (cap)

* The permissible concentration of dissolved Sodium Azide is not more than 0.1%.

5. Storage Conditions

Store the instrument and accessories in a clean, cool and dry place.
Storage temperature may vary from – 20°C to +50°C (from – 4°F to 122°F)

6. List of Recommended Reagents

Chemicals from A to Z

The following tables enlist the most frequently used reagents.
They provide useful information for the safe and efficient use of MICROLIT LENTUS®.
All the safety precautions and recommendations within this Operation Manual must be followed carefully.

Code explanations:

A = Good resistance

B = Acceptable with limitations

C = Not recommended

1 = Acid vapours (better resistance with lower concentration).
Do not leave the instrument on the bottle. Rinse with distilled water after use.

2 = Risk of damage, softening or discoloration of external parts through vapours.
Do not leave the instrument on the bottle. Rinse with distilled water after use.

3 = Reactivity with high purity ceramic valve system components.

List of Reagents

Chemicals A - Z

A	
Acetaldehyde (Ethanal)	A
Acetic acid 96%	A
Acetic acid 100% (glacial)	B/2
Acetic anhydride	B/2
Acetone (Propanone)	B/2
Acetonitrile (MECN)	A
Acetophenone	B/2
Acetyl Chloride	B/2
Acetylacetone	A
Acrylic acid	A
Acrylonitrile	B/2
Adipic acid	A
Allyl alcohol	A
Aluminum chloride	A
Amino acids	A
Ammonia 20%	B/2
Ammonia 20-30%	B/2
Ammonium chloride	A
Ammonium fluoride	A
Ammonium molybdate	A
Ammonium sulfate	A
Amyl alcohol (Pentanol)	A
Amyl chloride (Chloropentane)	B/2
Aniline	A
Ascorbic acid	A
n-Amyl acetate	B/2
B	
Barium chloride	A
Benzaldehyde	A
Benzene	B/2
Benzine	A
Benzoyl chloride	B/2
Benzyl alcohol	A
Benzyl chloride	B/2
Bis(2-ethylhexyl) phthalate	B/2
Boric acid 10%	A
Bromine	C/2
Bromobenzene	B/2
Bromonaphtalene	A
Butanediol	A
Butanol	A
Butyl acetate	B/2
Butyl methyl ether	B/2
Butylamine	B/2
Butyric acid	B/2
C	
Calcium carbonate	A
Calcium chloride	A
Calcium hydroxide	A
Calcium hypochlorite	A

List of Reagents

Chemicals A - Z

C	
Carbon disulfide	B/2
Carbon tetrachloride	B/2
Chlorine dioxide	B/2
Chlorine water	B/2
Chloro naphthalene	B/2
Chloroacetaldehyde 45%	A
Chloroacetic acid	A
Chloroacetone	B/2
Chlorobenzene	B/2
Chlorobutane	B/2
Chloroethanol	B/2
Chloroform (Trichloromethane)	B/2
Nitro-hydrochloric acid (Aqua regia)	A
Chlorosulfonic acid	B/2
Chlorosulfuric acid 100%	B/1/2
Chromic acid 100%	B/1/2
Chromosulfuric acid 100%	C/1/2
Citric acid	A
Copper fluoride	A
Copper sulfate	A
Covi-Ox-T70/ Mixed Tocopherol	A
Cresol	A
Cumene (Isopropylbenzene)	B/2
Cyanoacrylate	A
Cyclohexane	B/2
Cyclohexanone	B/2
Cyclopentane	B/2
D	
1,2-Diethylbenzene	B/2
1,4-Dioxane (Diethylene dioxide)	B/2
-Decanol	A
Decane	A
Di-(2-ethylhexyl) peroxydicarbonate	B/2
Dibenzyl ether	B/2
Dichloroacetic acid	A
Dichlorobenzene	A
Dichloroethane	A
Dichloroethylene	B/2
Diesel oil (Heating oil)	A
Diethanolamine	A
Diethylamine	B/2
Diethylene glycol	A
Diethylether	B/2
Dimethylacetamide	A
Dimethyl sulfoxide (DMSO)	B/2
Dimethylaniline	A
Dimethylformamide (DMF)	B/2

List of Reagents

Chemicals A - Z

E	
Ethanol	A
Ethanolamine	B/2
Ether	B/2
Ethyl acetate	B/2
Ethylbenzene	B/2
Ethylene chloride	B/2
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/2
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/2
Glycerin <40%	A
Glycolic acid 50%	A
H	
Heating oil (Diesel oil)	A
Heptane	A
Hexane	A
Hexanoic acid	A
Hexanol	A
Hydriodic acid	B/2
Hydrobromic acid	A
Hydrochloric acid 20% (HCl)	A
Hydrochloric acid 37% (HCl)	B/1
Hydrofluoric acid (HF)	A
Hydrogen peroxide	A
I	
Iodine	A
Iodine bromide	C/2
Iodine chloride	C/2
Isoamyl alcohol	A
Isobutanol	A
Isooctane	A
Isopropanol	A
Isopropyl ether	B/2
Iso-propylamine	B/2
L	
Lactic acid	A
M	
2-Methoxyethanol	A
Methanol	A
Methoxybenzene (Anisol)	B/2
Methyl benzoate	B/2
Methyl chloride (Chloromethane)	B/2
Methyl ethyl ketone (MEK/Butanone)	B/2
Methyl formate	A

List of Reagents

Chemicals A - Z

M	
Methyl iodide (Iodomethane)	B/2
Methyl methacrylate (MMA)	B/2
Methyl propyl ketone (2-Pentanone)	A
Methyl tert-butyl ether	B/2
Methylene chloride (Dichloromethane) (DCM)	B/2
Methylpentanone	A
Mineral oil (engine oil)	A
Monochloroacetic acid	A
N	
Nitric acid 100%	A
Nitric acid 30-70%	A
Nitric acid dil. <30%	A
Nitrobenzene	B/2
Nitromethane	B/2
N-methyl-2-pyrrolidone (NMP)	A
O	
Octane	A
Octanol	A
Oil (vegetable, animal)	B/2
Oil of turpentine	B/2
Oleic acid	A
Oleum (Fuming Sulfuric acid)	A
Oxalic acid	A
P	
Pentane	B/2
Peracetic acid	A
Perchloric acid 100%	B/2
Perchloric acid diluted	A
Perchloroethylene	B/2
Petroleum	B/2
Petroleum ether / spirit	B/2
Phenol	A
Phenylethanol	B/2
Phenylhydrazine	B/2
Phosphoric acid 100%	A
Phosphoric acid 85%	A
Piperidine	B/2
Potassium carbonate	C/3
Potassium chloride	A
Potassium dichromate	A
Potassium dihydrogen phosphate	A
Potassium hydroxide	C/3
Potassium hypochlorite	C/3
Potassium iodide	A
Potassium permanganate (persulfate)	A
Potassium peroxydisulfate	A
Potassium sulfate	A
Propionic acid (Propanoic acid)	A
Propylene glycol (Propane-1,2-diol)	A

List of Reagents

Chemicals A - Z

P	
Propylene oxide	A
Picric acid (Trinitrophenol)	B/2
Pyridine	B/2
Pyruvic acid	A
R	
Resorcin	A
S	
Salicylaldehyde	A
Scintilation fluid	A
Silver acetate	A
Silver nitrate	A
Sodium acetate	A
Sodium chloride (kitchen salt)	A
Sodium dichromate	A
Sodium fluoride	A
Sodium hydroxide 30%	A
Sodium hypochlorite	A
Sodium thiosulfate	A
Sulfonitric acid 100%	B/2
Sulfur dioxide	B/2
Sulfuric acid 100%	B/2
Sulfuric acid <10%	A
Sulfuric acid (10-75%)	B/1
Sulfuric acid (Cold conc.)	A
Sulfuric acid (Hot conc.)	B/2
T	
1,1,2-Trichlortrifluoroethane	B/2
Tartaric acid	A
Tetrachlorethylene	B/2
Tetrahydrofuran (THF)	B/2
Tetramethylammonium hydroxide	A
Toluene	B/2
Trichlorethylene	B/2
Trichloroacetic acid	B/2
Trichlorobenzene	B/2
Trichloroethane	B/2
Tricresyl phosphate	C/3
Triethanolamine	A
Triethylamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/2
Trifluoromethane (Fluoroform)	B/2
U	
Urea	A
Uric acid	C/3
X	
Xylene	B/2
Z	
Zinc chloride 10%	C/3
Zinc sulfate 10%	C/3

** Materials used in MICROLIT LENTUS® are carefully selected and tested for compatibility with hydrofluoric acid (HF)*

7. First Steps

First and foremost – check whether everything is there in the package.

Verify that the package includes:

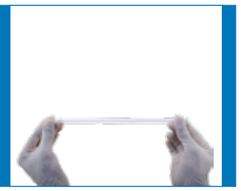
1.

Fig. 7.1

1 Bottle Top Dispenser
(Fig. 7.1)

2.

Fig. 7.2



1 Telescopic Tube
(Fig. 7.2)

3.

Fig. 7.3

1 Calibration Tool
(Fig. 7.3)

4.

Fig. 7.4

5 Bottle Adapters
(28 mm, 32 mm, 38 mm, 40 mm, 45 mm)

(Fig. 7.4)

5.

Fig. 7.5

1 Calibration Certificate
(Fig. 7.5)

6.

Fig. 7.6

1 Operation Manual
(Fig. 7.6)

8. Setting Up

⚠ Wear protective clothing, protective gear for the eyes and hands. Follow all safety instructions and observe limitations of use and operating constraints. (Refer to sections - 2,3,4)

1.

Fig. 8.1

Adjust the length of the telescopic tube to fit your particular reservoir. If you require a longer tube, it is provided on request. (Fig. 8.1)

2.

Fig. 8.2

Fix the telescopic tube. The tube's ends have different diameters. Please select the correct side for your instrument. (Fig. 8.2)

3.

Fig. 8.3

Choose the correct adapter for the bottle. The threaded platform base has a 30 mm screw thread. Five adapters are supplied to suit containers with a 28, 32, 38, 40, 45 mm and 30 mm (inbuilt adapter) screw neck. (Fig. 8.3)

4.

Fig. 8.4

Fix the adapter. (Fig. 8.4)

5.

Fig. 8.5

Mount the instrument. Screw it to the reservoir by applying gentle hand torque applied to the threaded platform base only. In case of removal, apply the same technique to the base, in the opposite direction. (Fig. 8.5)

The instrument is all set up and ready to use.

⚠ Do not operate the piston until the entire unit is safely and fully mounted on the reservoir bottle.

⚠ Always wear rubber gloves while operating the instrument or handling the bottle, especially when working with hazardous liquids. When mounted to a reagent bottle, always carry the instrument carefully.

Fig. 8.6

⚠ Do not press the piston down when the cap is on. Avoid splashing the reagent. The reagent can drip out from the discharge tube and cap. (Fig. 8.6)

9. Priming

1.

Fig. 9.1

First, open the cap of the dispensing tube.

⚠ For your safety, hold the discharge tube orifice against the inner wall of the appropriate receiving vessel. (Fig. 9.1)

2.

Fig. 9.2

Set the valve to 'Recirculate'. (Fig. 9.2)

Fig. 9.3

- For priming, gently pull the piston up (approximately by 30mm) and then down rapidly, till the lower end. (Fig. 9.3)
- Repeat this procedure five times.

3.

Fig. 9.4

Turn the valve to 'Dispense'.

⚠ To avoid splashes while priming, hold the discharge tube against the inner wall of the appropriate receiving vessel. Dispense liquid to prime the discharge tube until it is bubble free. Wipe away any remaining drops from the discharge tube.

⚠ Before using the instrument for the first time, ensure that it has been rinsed carefully and discard the first few samples dispensed. Avoid splashing.

10. Volume Setting and Dispensing

Volume setting

Volume Adjustment Knob is simple and easy to operate.

There are two positions of the knob as shown:

Fig. 10.1

Position 1

Locked

(Fig. 10.1)

Fig. 10.2

Position 2

Unlocked

(Fig. 10.2)

To set the volume, follow these simple steps:

1. Unlock the Knob by rotating it ANTICLOCKWISE.
2. The slider is now loose and can be moved up and down.
3. Set your desired volume by aligning the pointer with the scale.
4. To lock the set volume, turn the Knob from Position 2 to Position 1 by rotating it CLOCKWISE.

⚠ Over rotating the knob may lead to breakage.

Dispensing

⚠ Wear protective clothing, protective gear for the eyes and hands. Liquid may accumulate in the cap. To avoid splashes, dispense slowly. Follow all safety instructions and observe limitations of use and operating constraints.

1.

Fig. 10.3

Remove cap from the discharge tube.
(Fig. 10.3)

2.

Fig. 10.4

Before using the instrument, turn the valve to 'Dispensing'.
(Fig. 10.4)

3.

Fig. 10.5

Hold the discharge tube orifice against the inner wall of the appropriate receiving vessel.
(Fig. 10.5)

4.

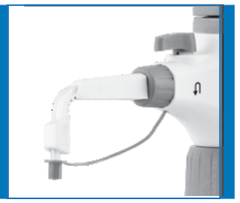
Fig. 10.6

Gently lift the piston until the upper end. Press the piston downwards slowly and steadily with minimal force until the lower end.
(Fig. 10.6)

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

6.

Fig. 10.7



Reattach the cap to the discharge tube.
(Fig. 10.7)

11. Error Limits

The error limits (Accuracy and Coefficient of Variation) mentioned below are in accordance with the nominal capacity (or maximum volume) indicated on the instrument. These are obtained by using the instrument with distilled water at equilibrium, ambient temperature of 20 °C or 68°F, while operating the device smoothly and steadily.
The error limits are well within the limits of DIN EN ISO 8655-5.

Volume Range	Increment	Specifications ISO 8655			
		Accuracy		CV	
		±%	±ml	±%	±ml
0.25-2.5 ml	0.05 ml	0.5	0.0125	0.2	0.005
0.5-5 ml	0.1 ml	0.5	0.025	0.2	0.010
1-10 ml	0.2 ml	0.5	0.050	0.1	0.010
2.5-30 ml	0.5 ml	0.5	0.150	0.1	0.030
5-60 ml	1.0 ml	0.5	0.300	0.1	0.060

12. User Calibration Procedure

MICROLIT LENTUS® is laboratory calibrated at its nominal volume.
However, due to changes in environmental conditions and the viscosity of the media / fluids which are dispensed, we recommend gravimetric volume testing every 3-12 months.
Gravimetric volume testing, in accordance with DIN EN ISO 8655-6, is performed as follows (for measurement conditions, see section12):

Re-calibration

1. Set the instrument to the nominal volume or any other volume which is most commonly used by you. Follow the common rules for calibration used in statistical quality control (ISO 8655-5).

2. Set the volume and dispense five full volumes of distilled water at 20°C on an electronic balance to establish the actual mean volume of liquid dispensed. If the gravitational average result varies from the volume displayed, you should re-calibrate the instrument.

3.

Fig. 12.1

For re-calibration, pull the cap outwards to expose the calibration nut.
(Fig. 12.1)

4.

Fig. 12.2

Using the calibration tool, turn the calibration nut clockwise to reduce the volume and anticlockwise to increase it. Repeat this procedure till the desired volume is achieved on the electronic balance.
(Fig. 12.2)

13. Maintenance / Cleaning

MICROLIT LENTUS® should be cleaned in the following situations:

- 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 cap.

⚠ All maintenance/cleaning procedures should be carried out while wearing suitable eye protection and protective clothing.
When in doubt, consult your safety officer.

- Make sure that the instrument is completely empty.
- Place the instrument into an empty sink together with its reservoir.
- Unscrew the threaded platform base from the reservoir and lift the instrument's intake tube carefully out of the reservoir, whilst tapping it against the reservoir's aperture to shake off any droplets from the intake tube.
- Hold the dispensing nozzle over the aperture of the reservoir and apply gentle piston strokes in order to return any contents into the reservoir.
- Empty the instrument completely and flush thoroughly with distilled water.
- If the piston barrel is still not completely clean, you need to disassemble the instrument. (Refer to section 15)

14. Disassembling and Assembling for Cleaning and Servicing

Procedure to disassemble the piston:

1.

Fig. 14.1

Pull the cap outwards to expose the calibration nut.
(Fig. 14.1)

2.

Fig. 14.2

Unscrew the calibration nut with the help of calibration tool to disassemble the piston and shaft from the main housing.
(Fig. 14.2)

3.

Fig. 14.3

After unscrewing, pull out the shaft.
(Fig. 15.3)

4.

Fig. 14.4

Rinse the piston and shaft with deionized water.
(Fig. 15.4)

5.

Fig. 14.5

Clean the cylinder with a bottle-brush.
If necessary, carefully remove deposits at the edge of the glass cylinder.
(Fig. 14.5)

6. Flush all the parts of the instrument with deionized water.

7.

Fig. 14.6

Insert the piston completely into the cylinder and then reassemble the instrument using the calibration tool by screwing back the piston.
(Fig. 14.6)

8.

Fig. 14.7

Snap the cap back to complete the assembly.
(Fig. 15.7)

Procedure to disassemble the Delivery Pipe

1.

Fig. 14.8

Straighten the delivery pipe.
(Fig. 14.8)

2.

Fig. 14.9

Unscrew the chuck nut and pull out the delivery pipe.
(Fig. 14.9)

3. Clean the pipe with deionized water.

Procedure to re-assemble the Delivery Pipe

1.

Fig. 14.10

First push the delivery pipe into the lower housing till it stops going in further.
(Fig. 14.10)

2.

Fig. 14.11

Screw the chuck nut to complete the assembly.
(Fig. 14.11)

15. Autoclaving

MICROLIT LENTUS® is fully autoclavable at 121°C (or 250°F) and 1 bar absolute (15 psi) with a holding time of at least 15 minutes.

NOTE – Only the piston needs to be removed for autoclaving the instrument. Piston is also autoclavable.

Disassembling for autoclaving

1.

Fig. 15.1

Pull the cap outwards to expose the calibration nut.
(Fig. 15.1)

2.

Fig. 15.2

Unscrew the calibration nut with the help of calibration tool to disassemble the piston and shaft from the main housing.
(Fig. 15.2)

3.

Fig. 15.3

After unscrewing, pull out the shaft.
(Fig. 15.3)

4.

Fig. 15.4

This is the piston-shaft sub-assembly.
(Fig. 15.4)

5.

Fig. 15.5

Autoclave the two sub-assemblies at 121°C and
15 psi pressure for 10-15 minutes.
(Fig. 15.5)

6. The volume adjustment knob should always be kept in the 'unlocked' position while autoclaving (Refer fig 10.2).

Cooling

After autoclaving, cool the dispenser at room temperature for
at least 2 hours before use.

Re-assembling after autoclaving

1.

Fig. 15.6

Insert the piston completely into the cylinder and
then reassemble the instrument.
Use the calibration tool to screwing the piston.
(Fig. 15.6)

2.

Fig. 15.7

Snap the cap back to complete the assembly.
(Fig. 15.7)

Dispenser is now ready for use. Recalibration is required after autoclaving.

16. Troubleshooting

Problem	Possible cause	Solution
Piston difficult to move	Formation of crystals or deposition of dirt	Stop dispensing immediately. Loosen piston in circular motion, but do not disassemble. Follow the cleaning instructions. (Refer to section13)
Air bubbles appear in the instrument	Reagent with high vapour pressure has been drawn in too quickly.	Draw the reagent slowly.
	The instrument has not been primed.	Prime the instrument (Refer to section 9)
	Filling tube is loose or damaged.	Push the filling tube on firmly. If necessary, cut off approx. 1 cm of the tube at the upper end and then re-connect it or replace it.
	Liquid reservoir is empty.	Refill reservoir and prime the unit.
	The filling action is too fast.	Fill and dispense slowly.
	The piston is leaking.	Clean the piston. Refer to section 13. If problem persists, replace it.
	The discharge valve is leaking	Clean by flushing thoroughly with distilled water. (Refer to section 13)
Dispensing not possible	Dispensing nozzle is blocked.	Disassemble the dispensing nozzle and flush thoroughly with distilled water.
	Discharge valve is stuck.	Clean the unit by immersing valve assembly in distilled water. (Refer to section 13)
Wrong dispensing volume	The instrument is not calibrated.	Follow user calibration steps. (Refer to section 12)
Barrel does not fill with liquid	Inlet tube is not fitted firmly.	Connect inlet tube correctly. (Refer to section 8)
Filling not possible	Adjust volume to minimum setting.	Set to the required volume. (Refer to section 10)

17. Guidelines for Return

Follow these guidelines, before sending the instrument for repair:

- Please clean the instrument carefully.
- On no account should the sent instrument contain any reagent.
- The sent instrument can only be checked and repaired if it has been carefully cleaned and decontaminated, beforehand.
- Forcefully opening the instrument invalidates any warranty claim.
- While packing the instrument for return, please enclose a detailed description of the trouble that has occurred and the reagents that were used with the instrument.