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Bottle Top Dispenser with
Dual Inlet™ Technology

MICROLITULTIMUS



OPERATION MANUAL

EXPERIENCE PRECISION

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<div data-bbox="310 350 636 378"> 1. Intended Use of the Instrument </div> <p data-bbox="401 399 936 461">MICROLIT ULTIMUS is a Bottle Top Dispenser (BTD). It is a high precision liquid handling instrument intended for use in laboratories for dispensing reagents and chemicals that are compatible with it. (Refer to section 6)</p> <div data-bbox="310 505 539 532"> 2. Safety Instructions </div> <p data-bbox="401 553 982 677">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.</p> <p data-bbox="359 699 743 719">⚠ Please read the following instructions carefully.</p> <ul data-bbox="359 742 972 1250" style="list-style-type: none"> • 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. <div data-bbox="669 1304 686 1320">1</div>	<ul data-bbox="1100 357 1730 779" style="list-style-type: none"> • 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) <div data-bbox="1050 823 1379 850"> 3. Functions and Limitations of Use </div> <p data-bbox="1140 867 1713 990">MICROLIT ULTIMUS is designed to dispense liquids 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 and Borosilicate glass.</p> <p data-bbox="1140 1013 1245 1032">Physical limits</p> <p data-bbox="1140 1036 1738 1055">MICROLIT ULTIMUS is designed to be operated under the following physical limits.</p> <ul data-bbox="1100 1078 1734 1268" style="list-style-type: none"> • Maintain instrument temperature 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 mm²/s. (dynamic viscosity [mPas] = kinematic viscosity [mm² /s] x density [g/cm³]) • Use fluids with density upto 2.2 g/cm³. <div data-bbox="1407 1304 1423 1320">2</div>
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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 14)
- 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 ULTIMUS 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 (e.g. trace material analysis, food sector etc.). 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*)
- Liquids that attack borosilicate glass (e.g. Hydrofluoric acid)
- Hydrochloric acid > 40% and Nitric acid >70% | Tetrahydrofuran | Trifluoroacetic acid
- Explosive liquids (e.g. Carbon Disulfide)
- 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 ULTIMUS. 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 = Chemical degradation of glass parts (plunger/barrel)

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
Bromonaphthalene	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)	B/2
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
Covt-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
1-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

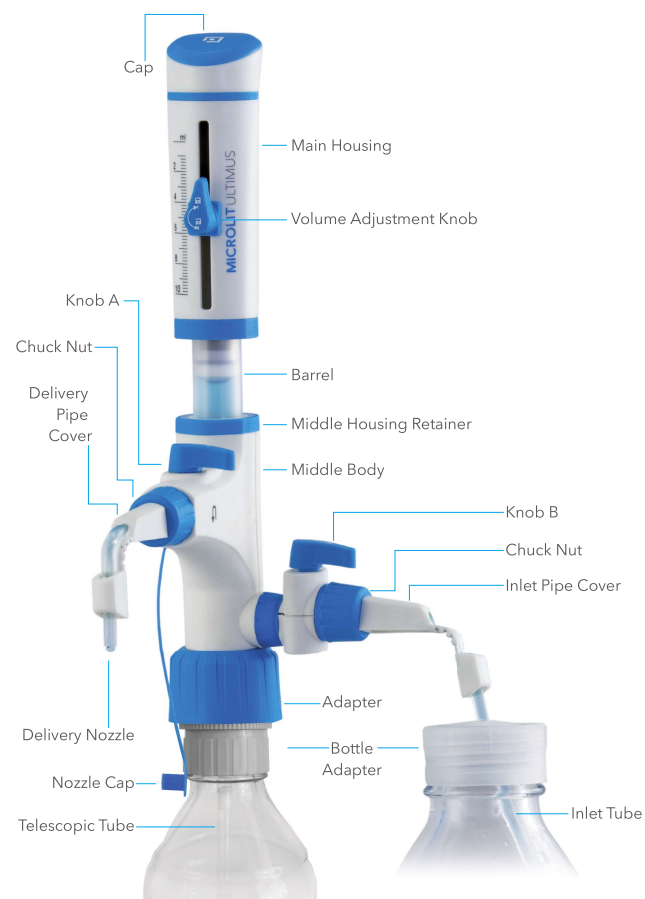
Chemicals A - Z	
E	
Ethanol	A
Ethanolamine	B/2
Ether	B/2
Ethyl acetate	B/2
Ethylbenzene	B/2
Ethylene chloride	B/2
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/2
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/2
Glycerin <40%	A
Glycolic acid 50%	A
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)	C/3
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%	C/2
Nitric acid 30-70%	B/2
Nitric acid dil. <30%	B/2
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 chloride	A
Potassium dichromate	A
Potassium dihydrogen phosphate	A
Potassium hydroxide	A
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
Propylene oxide	A
Picric acid (Trinitrophenol)	B/2

List of Reagents

Chemicals A - Z	
P	
Pyridine	B/2
Pyruvic acid	A
R	
Resorcin	A
S	
Salicylaldehyde	A
Scintillation 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-Trichlorotrifluoroethane	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
Triethanolamine	A
Triethylamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/2
Trifluoromethane (Fluoroform)	B/2
U	
Urea	A
X	
Xylene	B/2
Z	
Zinc chloride 10%	A
Zinc sulfate 10%	A



7. First Steps

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

Verify that the package includes:

1.

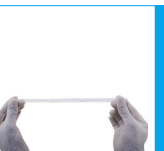
Fig. 7.1



1 Bottle Top Dispenser
(Fig. 7.1)

2.

Fig. 7.2



1 Telescopic Tube
(Fig. 7.2)

3.

Fig. 7.3



1 Extension Tube
(Fig. 7.3)

4.

Fig. 7.4



1 Calibration Tool
(Fig. 7.4)

5.

Fig. 7.5



5 Bottle Adapters
(28 mm, 32 mm, 38 mm, 40 mm, 45 mm)
(Fig. 7.5)

6.

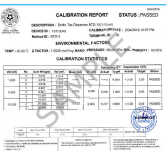
Fig. 7.6



4 Bottle Adapters for the second bottle
(Fig. 7.6)

7.

Fig. 7.7



1 Calibration Certificate
(Fig. 7.7)

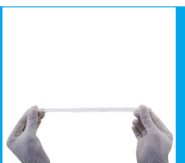
8. 1 Operation Manual

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 - (first inlet 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, in case of ULT-2.5, ULT-5 and ULT-10 and a 45 mm screw thread for ULT-30, ULT-60 and ULT-100. In the latter case, a reducer is also pre-fitted to fix the extra adapters. If a GL 45 bottle neck is used, then the reducer can be removed and the instrument can be mounted directly. 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.

The instrument, with the telescopic tube, will look as shown in Fig. 8.5

6.

Fig. 8.6










For assembling the second inlet tube or the Extension Tube, remove the cap of the second inlet. (Fig. 8.6)

7.

Fig. 8.7



Insert the Extension Tube attachment into the hole of the second inlet. Push the tube to ensure a secure fit. (Fig. 8.7)

<div data-bbox="352 354 382 376">8.</div> <div data-bbox="331 435 361 490">Fig. 8.8</div> <div data-bbox="373 383 558 542">  </div> <div data-bbox="579 428 919 493"> <p>Screw the chuck nut on the Extension Tube to tightly secure the inlet pipe. (Fig. 8.8)</p> </div> <div data-bbox="352 565 382 587">5.</div> <div data-bbox="331 646 361 701">Fig. 8.9</div> <div data-bbox="373 594 558 753">  </div> <div data-bbox="579 639 903 704"> <p>The tube can now be extended or reduced depending on the depth of the bottle. (Fig. 8.9)</p> </div> <div data-bbox="352 776 382 799">9.</div> <div data-bbox="331 857 361 912">Fig. 8.10</div> <div data-bbox="373 805 558 964">  </div> <div data-bbox="579 841 957 928"> <p>There is an additional set of adapters/caps to mount on the second bottle to avoid any exposure to air and fumes. (Fig. 8.10)</p> </div> <div data-bbox="344 987 382 1010">10.</div> <div data-bbox="331 1068 361 1123">Fig. 8.11</div> <div data-bbox="373 1016 558 1175">  </div> <div data-bbox="579 1062 802 1127"> <p>Mount the correct cap on the second bottle by screwing it. (Fig. 8.11)</p> </div> <div data-bbox="659 1295 697 1325">15</div>	<div data-bbox="1079 354 1117 376">11.</div> <div data-bbox="1066 435 1096 490">Fig. 8.12</div> <div data-bbox="1108 383 1293 542">  </div> <div data-bbox="1314 428 1629 493"> <p>Pass the Extension Tube through the hole on the cap of the second bottle. (Fig. 8.12)</p> </div> <div data-bbox="1079 565 1117 587">12.</div> <div data-bbox="1066 646 1096 701">Fig. 8.13</div> <div data-bbox="1108 594 1293 753">  </div> <div data-bbox="1314 649 1650 695"> <p>The instrument is all set up and ready to use. (Fig. 8.13)</p> </div> <div data-bbox="1087 776 1663 906"> <ul style="list-style-type: none"> ⚠ 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. </div> <div data-bbox="1066 977 1096 1032">Fig. 8.14</div> <div data-bbox="1108 925 1293 1084">  </div> <div data-bbox="1293 974 1722 1039"> <ul style="list-style-type: none"> ⚠ 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. 8.14) </div> <div data-bbox="1394 1295 1432 1325">16</div>
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9. Priming

1.

Fig. 9.1



In this instrument, two inlet paths, A and B, have to be primed (Fig. 9.1)

2.

Fig. 9.2



First, open the cap of the dispensing tube. (Fig. 9.2)

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

INLET A

Fig. 9.3



Positions:

Knob A - Closed

Knob B - Closed

(Fig. 9.3)

Fig. 9.4



I. For priming, gently pull the piston up (approximately by 30mm) and then down rapidly, till the lower end.

II. Repeat this procedure five times.

(Fig. 9.4)

INLET B

Fig. 9.5



Positions:

Knob A - Open

Knob B - Open

(Fig. 9.5)

NOTE -

The liquid will flow out of the second bottle, without interacting with the liquid in the first bottle. (Fig. 9.6)

⚠ Ensure that the receiving vessel is kept directly below the delivery nozzle before initiating the operation.

Fig. 9.6



I. For priming, gently pull the piston up (approximately by 30mm) and then down rapidly, till the lower end.

II. Repeat this procedure five times.

(Fig. 9.6)

NOTE -

In case the liquid in the second bottle is the same as the liquid in the first bottle, then close Knob A and open Knob B. The liquid will flow from the second bottle into the first bottle for re-filling. After a few dispensing cycles, the second inlet will be primed as well and no liquid will be wasted.

⚠ 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 Modes of Operation

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. Turn the Knob from Position 1 to Position 2 by rotating it ANTICLOCKWISE.
2. Set your desired volume by aligning the pointer with the scale.
3. 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.

Modes of operation

- ⚠ 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. Standard dispensing

Fig. 10.3



Positions:

Knob A - Open

Knob B - Closed

(Fig 10.3)

- ⚠ Before initiating dispensing make sure that dead volume is removed.
(Refer to section 11)

I.

Fig. 10.3 A



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

II.

Fig. 10.3 B



Hold the discharge tube orifice against the inner wall of the appropriate receiving vessel.
(Fig 10.3 B)

- III. Gently lift the piston until the upper end. Press the piston downwards slowly and steadily with minimal force until the lower end.

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

V.

Fig. 10.3 C



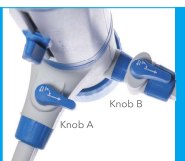
Reattach the cap to the discharge tube
(Fig. 10.3 C)

2. Bottle re-filling

NOTE -

This feature is designed to re-fill the main bottle without dismounting the instrument.

Fig. 10.4



Positions:

Knob A - Closed

Knob B - Open

(Fig 10.4)

⚠ Second bottle should have the same liquid as the first bottle.

⚠ Volume may be set to the maximum for quick refilling.

I.

Fig. 10.4 A



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

(Fig 10.4A)

II. Bottle will be refilled with the liquid from the second bottle.

3. Rinsing

NOTE -

This feature is designed to rinse the instrument with distilled water without dismounting the instrument.

Fig. 10.5



Positions:

Knob A - Open

Knob B - Open

(Fig 10.5)

⚠ Make sure the second liquid is distilled water.

⚠ Make sure a suitable receiving vessel is placed below the outlet tube.

I. Set the volume adjustment knob to maximum.

II. Remove the cap from the discharge tube.

III. Hold the discharge tube orifice against the inner wall of an appropriate receiving vessel.

IV.

Fig. 10.5 A



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

(Fig 10.5 A)

V. Run the rinse cycle at least twice.

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

4. Dual reagent dispensing

Fig. 10.6



Position 1:

Knob A - Open

Knob B - Closed

(Fig 10.6)

Fig. 10.7



Positions:

Knob A - Open

Knob B - Open

(Fig 10.7)

Position 2 dispenses liquid out of the second bottle.

NOTE -

This feature enables the user to use two reagents with one instrument without dismounting the instrument.

- ⚠ Make sure a suitable receiving vessel is placed below the outlet tube.
- ⚠ Before switching to liquid 1 or 2, make sure that the dead volume is removed. (Refer to section 11)

I.

Fig. 10.7 A



Remove the cap from the discharge tube.

(Fig 10.7 A)

- II. Hold the discharge tube orifice against the inner wall of an appropriate receiving vessel.
- III. Gently lift the piston until the upper end. Press the piston downwards slowly and steadily with minimal force until the lower end.
- IV. Wipe off the discharge tube against the inner wall of the receiving vessel.

11. Removal of Dead Volume

IMPORTANT

When switching from position 1 to 2 or from Position 2 to 1, in order to dispense the first/second reagent, please note that there will be dead volume of the first reagent in the delivery tube.

To remove the dead volume, follow this method:

- Switch to position 1/2 (depending on mode needed).
- Take a new receiving vessel to take out the dead volume/waste reagent out.
- Set the volume to 3ml for ULT-2.5, ULT-5 and ULT-10.
- Set the volume to 5ml for ULT-30, ULT-60 and ULT-100.
- Execute one cycle of dispensing. (Two cycles are advised to be completely sure that the entire dead volume is removed.)
- Remove the second vessel (or the waste collection vessel).
- Instrument is now ready to dispense the second reagent.

12. 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	0.6	0.015	0.2	0.005
0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
10-100 ml	2.0 ml	0.6	0.600	0.2	0.200

13. User Calibration Procedure

MICROLIT ULTIMUS 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 'Error Limits'):

Re-calibration

- ▲ Make sure that the instrument is primed.
- ▲ Make sure an appropriate receiving vessel is placed below the outlet tube.

Set the instrument to standard dispensing mode.



Positions:

Knob A - Open

Knob B - Closed

(Fig 13.1)

- 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).
- 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.
-



For re-calibration, pull the cap outwards to expose the calibration nut.
(Fig.13.2)

IV.



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.13.3)

NOTE -
Once the calibration is finished, also check the reading for the second inlet.
Set the instrument to rinse mode.



Positions:

Knob A - Open

Knob B - Open

(Fig 13.4)

Check the readings at the desired volume on the electronic balance.

After calibrating the first liquid, the second liquid will be automatically calibrated.

14. Maintenance / Cleaning

MICROLIT ULTIMUS 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)

15. Disassembling and Assembling for Cleaning and Servicing

Procedure to disassemble the piston:

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

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

5.

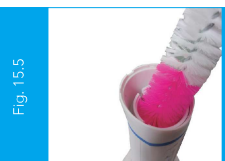


Fig. 15.5

Clean the cylinder with a bottle-brush. If necessary, carefully remove deposits at the edge of the glass cylinder. (Fig. 15.5)

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

7.



Fig. 15.6

Insert the piston completely into the cylinder and then reassemble the instrument using the calibration tool by screwing back the piston. (Fig. 15.6)

8.



Fig. 15.7

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

Procedure to disassemble the Delivery Pipe A:

1.

Fig. 15.8



Unscrew the chuck nut and pull out the delivery pipe. (Fig. 15.8)

2. Clean the pipe with deionized water.

Procedure to disassemble the Inlet Pipe B:

1.

Fig. 15.9



Unscrew the chuck nut and pull out the inlet pipe. (Fig. 15.9)

2. Clean the pipe with deionized water.

Procedure to re-assemble the Delivery Pipe A:

1.

Fig. 15.10



First push the delivery pipe into the lower housing till it stops going in further. (Fig. 15.10)

2.

Fig. 15.11



Screw the chuck nut to complete the assembly. (Fig. 15.11)

Procedure to re-assemble the Inlet Pipe B

1.

Fig. 15.12



Insert the extension tube attachment into the hole of the inlet B. Push the tube to ensure a tight fit. (Fig. 15.12)

2.

Fig. 15.13



Screw the chuck nut on the extension tube to tightly secure the inlet pipe. (Fig. 15.13)

16. Autoclaving

MICROLIT ULTIMUS 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.



Pull the cap outwards to expose the calibration nut. (Fig. 16.1)

2.



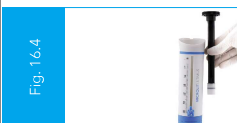
Unscrew the calibration nut with the help of calibration tool to disassemble the piston and shaft from the main housing. (Fig. 16.2)

3.



After unscrewing, pull out the shaft. (Fig. 16.3)

4.



This is the piston-shaft sub-assembly. (Fig. 16.4)

5.



Autoclave the two sub-assemblies at 121°C and 15 psi pressure for 10-15 minutes. (Fig. 16.5)

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.



Insert the piston completely into the cylinder and then reassemble the instrument. Use the calibration tool to screwing the piston. (Fig. 16.6)

2.



Snap the cap back to complete the assembly. (Fig. 16.7)

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

17. 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 section 14)
Air bubbles appear in the instrument	Reagent with high vapour pressure has been drawn in too quickly. The instrument has not been primed. Filling tube is loose or damaged. Liquid reservoir is empty. The filling action is too fast. The piston is leaking. The discharge valve is leaking	Draw the reagent slowly. Prime the instrument (Refer to section 9) 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. Refill reservoir and prime the unit. Fill and dispense slowly. Clean the piston. Refer to section 14. If problem persists, replace it. Clean by flushing thoroughly with distilled water. (Refer to section 14)
Dispensing not possible	Dispensing nozzle is blocked. Discharge valve is stuck.	Disassemble the dispensing nozzle and flush thoroughly with distilled water. Clean the unit by immersing valve assembly in distilled water. (Refer to section 14)
Wrong dispensing volume	The instrument is not calibrated.	Follow user calibration steps. (Refer to section 13)
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)

18. 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.