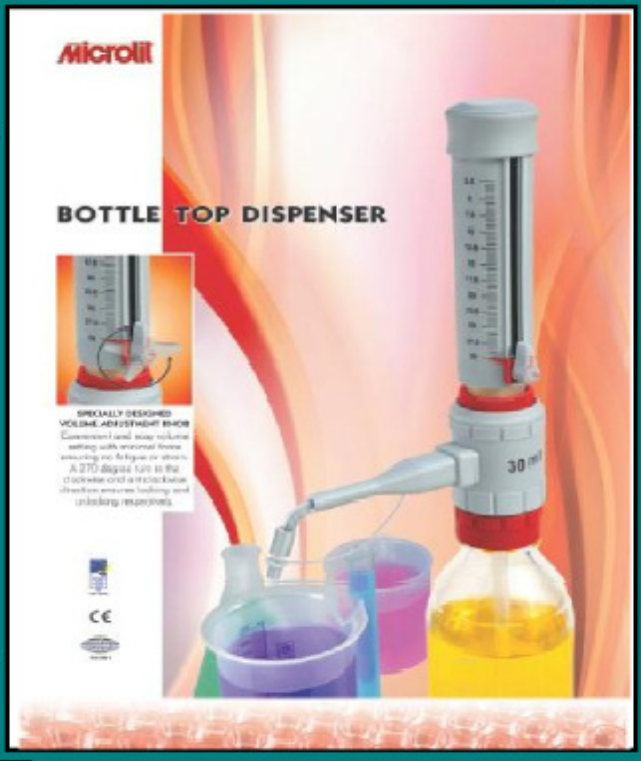
Liquid Dispensers 2016 MicroLIT

Ultimas BottleTop Dispenser

High Precision MicroPipette

Electronic MicroPipettes



L'l Pipette

e-Fill Pipette Filler

Stands for MicroPipettes

e-Burette

Microlit

ISO 13485

CE

ISO 9001

Ultimus

Bottle Top Dispenser
with Dual inlet Technology

BOTTLE TOP DISPENSER | *Ultimus*

With Dual Inlet Technology

Microlit has yet again answered the needs of the customers. With this Bottle Top Dispenser Microlit's R&D has solved the biggest problem of the users : Re-filling the bottle and rinsing the instrument WITHOUT DISMOUNTING from the Bottle.

Microlit is proud to present most advanced, state of the art Dispenser in the world : *Ultimus*.

With a world wide patented technology Microlit's R&D has delivered a product that combines unique functionality, user-friendliness and performance. *Ultimus* offers its users 4 modes of dispensing in one Dispenser.

First ever Dispenser offering Dilution, Rinsing, Dual Liquid Handling and Re-circulation in a single unit.

Ultimus offers four modes of operation:

1. STANDARD DISPENSING

Knob A - Open
Knob B - Closed

In this mode the dispenser dispenses the liquid normally into the receiver from the bottle it is mounted on.

2. PURGING

Knob A - Closed
Knob B - Closed

In this mode the liquid is re-circulated into the same bottle on which the dispenser is mounted. This process removes the air from the dispenser without wasting any reagent.

3. DILUTION/RINSING/SECOND LIQUID DISPENSING

Knob A - Open
Knob B - Open

In this mode the liquid from a second source can be dispensed into the receiver. The second liquid can be distilled water, thus allowing the user to rinse the instrument without dismounting from the bottle or for dilution of the reagent in the receiver.

4. BOTTLE REFILLING

Knob A - Closed
Knob B - Open

In this mode the liquid from a second source can be used to refill the bottle without dismounting the dispenser.

ADJUSTABLE DELIVERY NOZZLE
Adjustable delivery nozzle to facilitate dispensing ease in all demanding laboratory conditions.

SPECIALLY DESIGNED VOLUME ADJUSTMENT KNOB
180° Rotation for Easy & Effortless Volume Setting.

360° ROTATION
Specially designed adapter allows 360° rotation, providing full flexibility in working.

SPRINGLESS VALVE
Specially designed, springless, PTFE valve manifold ensures high chemical compatibility and jamming free valve functioning.

UNIQUE PISTON
PTFE Piston with ETP O-Ring Ensures Very High Chemical Compatibility & Wiper Like Smooth, Effortless Piston Movement.

Six unique volume ranges :

a. 0.25 - 2.5 ml
b. 0.5 - 5 ml
c. 1 - 10 ml
d. 2.5 - 30 ml
e. 5 - 60 ml
f. 10 - 100 ml

Fully Autoclavabl

CALIBRATION

Every product is calibrated in a ISO 17025 accredited laboratory according to ISO 8655 Standards.

Calibration tool is included for quick in-lab recalibration.

CALIBRATION TOOL

ADAPTERS
Fit most laboratory reagent bottles.
Available sizes: 28, 30, 32, 36, 40 & 45 mm

RESERVOIR COVERS
There is an additional set of reservoir covers for the second bottle.
Available sizes: 28, 32, 36, 40 & 45 mm

EXTENDABLE TUBES
Coiled extension tube and telescoping inlet tube adjust to a variety of bottle sizes

COMPONENT DESCRIPTION

Component	Description
Piston	PTFE & ETP
Cylinder	Borosilicate Glass
Volume Adjustment Knob	PP, 180° Rotation
Valve Housing	PFA
Recirculation Valve Housing	PFA
Valve Assembly	Borosilicate Glass Ball & Seat
Discharge Assembly	PTFE
Delivery Tube	FEP
Inlet Tube	FEP
Calibration	Individually calibrated and certified. In-lab easy calibration by the user is also possible.
Accuracy & Reproducibility	In accordance with ISO 8655 standards.
Compatibility	Excellent compatibility with all reagents except HF

SPECIFICATIONS

Model No.	Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± ml
ULT-2.5	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005
ULT-5	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
ULT-10	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
ULT-30	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
ULT-60	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
ULT-100	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200

Error limits (Accuracy & Coefficient of variation) according to the nominal capacity (= maximum volume) indicated on the instrument, obtained with instrument and distilled water at equilibrium with ambient temperature at 20 °C, and with smooth, steady operation. The error limits are well within the limits of DIN EN ISO 8655-2.

Certifications

ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Satisfaction Guaranteed

Microlit products are manufactured under strict quality control and GMP norms. However, if you are dissatisfied in any way with the operation of any Microlit product, call us or your nearest Microlit dealer for a free replacement.

Microlit

Microlit

ISO 13485

CE

ISO 9001

INDIA DESIGN MARK

Beatus

Bottle Top Dispenser

(Re-Circulation Valve)

BOTTLE TOP DISPENSER | *Beatus*

With Re-Circulation Valve

Beatus is the next generation of highly robust and reliable dispensing, designed and developed by MICROLIT's strong R&D. Several unique features provided in *Beatus*, makes it usable with a wider range of reagents with high precision and accuracy. *Beatus* has re-circulation valve for re-directing the liquid into the bottle for bubble free dispensing without any loss of reagent.

Special emphasis has been given to ensure smooth & soft plunger operation and ease of working in demanding laboratory conditions.

Awarded INDIA DESIGN MARK

India Design Mark is a design standard, a symbol, which recognises good design. It symbolises excellence in form, function, quality, safety, sustainability, and innovation and communicates that the product is usable, durable, aesthetically appealing and socially responsible.

FEATURES :

Six unique volume ranges :

a. 0.25 - 2.5 ml
b. 0.5 - 5 ml
c. 1 - 10 ml
d. 2.5 - 30 ml
e. 5 - 60 ml
f. 10 - 100 ml

RE-CIRCULATION VALVE
Prevents loss of reagent during purging.

Fully Autoclavab

ADJUSTABLE DELIVERY NOZZLE
Adjustable delivery nozzle to facilitate dispensing ease in all demanding laboratory conditions.

SPECIALLY DESIGNED VOLUME ADJUSTMENT KNOB
180° Rotation for Easy & Effortless Volume Setting.

360° ROTATION
Specially designed adapter allows 360° rotation, providing full flexibility in working.

SPRINGLESS VALVE
Specially designed, springless, PTFE valve manifold ensures high chemical compatibility and jamming free valve functioning.

UNIQUE PISTON
PTFE Piston with ETP O-Ring Ensures Very High Chemical Compatibility & Wiper Like Smooth, Effortless Piston Movement.

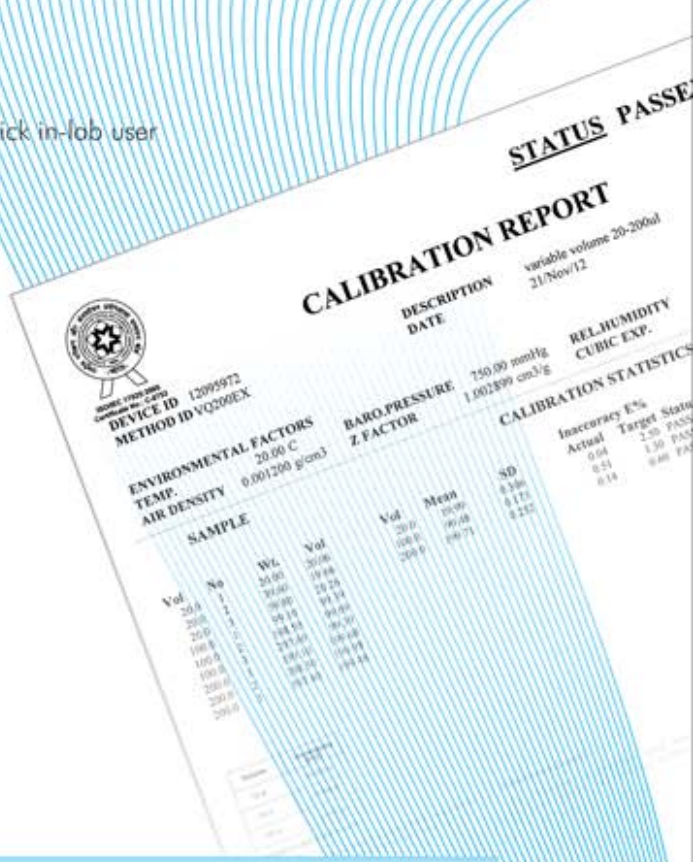
ADAPTORS
Adaptors to fit most of the laboratory reagent bottles are provided in the following sizes : 28, 30, 32, 36, 40 & 45mm.

CALIBRATION :

Specially designed calibration tool is provided for convenient and quick in-lab user re-calibration. This is in compliance with GLO/ISO norms.

Removable Cap for Calibration

Calibration Tool



COMPONENT DESCRIPTION

Component	Description
Piston	PTFE & ETP
Cylinder	Borosilicate Glass
Volume Adjustment Knob	PP. 180° Rotation
Valve Housing	PFA
Re-Circulation Valve Housing	PFA
Valve Assembly	Borosilicate Glass Ball & Seat
Discharge Assembly	PTFE
Delivery Tube	FEP
Inlet Tube	FEP
Calibration	Individually calibrated and certified. In-lab easy Calibration
	by the user is also possible.
Accuracy & Reproducibility	In accordance with ISO 8655 standards.
Compatibility	Excellent compatibility with all reagents except HF

SPECIFICATIONS & ORDERING INFORMATION

Model No.	Vol. Range	Increment	Accuracy		CV	
			±%	± ml	±%	± ml
BEAT-2.5	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005
BEAT-5	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
BEAT-10	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
BEAT-30	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
BEAT-60	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
BEAT-100	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200

Certifications

ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

INDIA DESIGN MARK
GOOD DESIGN

Satisfaction Guaranteed

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Microlit

Microlit

BOTTLE TOP DISPENSER

SPECIALLY DESIGNED VOLUME ADJUSTMENT KNOB

Convenient and easy volume setting with minimal force ensuring no fatigue or strain. A 270 degree turn in the clockwise and anticlockwise direction ensures locking and unlocking respectively.

ISO 13485

CE

ISO 9001

BOTTLE TOP DISPENSER RESEARCH

FULLY AUTOCLAVABLE

Microlit Bottle top dispenser is another genius of its strong R & D base. Responding to the needs of the present generation, Microlit is proud to offer its NEW BOTTLE TOP DISPENSER which is an unique combination of competitive pricing and high performance.

All wetted parts are PTFE, FEP and Borosilicate Glass only which allows the instrument to be used with wide variety of laboratory chemicals.

High precision and accuracy is ensured through careful selection of raw material and several stages of strict quality checks during manufacturing process.

Each instrument is individually calibrated in ISO 17025 accredited laboratory in accordance with ISO 8655 standards and comes with Individual Calibration certificate.

Features :

- Available in seven volume ranges :
  - a. 0.25 - 2.5 ml
  - b. 0.5 - 5 ml
  - c. 1 - 10 ml
  - d. 2.5 - 30 ml
  - e. 5 - 60 ml
  - f. 10 - 100 ml
  - g. 50 - 400 ml
- Smooth, effortless plunger movement and bubble free dispensing.
- Easy to dis-assemble for cleaning and servicing.
- Instrument is fully autoclavable at 121°C , 15psi. for 10 - 15 mins.

SPECIALLY DESIGNED VOLUME ADJUSTMENT KNOB

Convenient and easy volume setting with minimal force ensuring no fatigue or strain. A 270 degree turn in the clockwise and anticlockwise direction ensures locking and unlocking respectively.

ADJUSTABLE DELIVERY NOZZLE

Adjustable delivery nozzle to facilitate dispensing ease in all demanding laboratory conditions.

ADAPTORS

Adaptors to fit most of the laboratory reagent bottles are provided in the following sizes : 28, 30, 32, 36, 40 & 45mm.

Simple, user friendly instrument suitable for all laboratory applications except HF.

Strict quality control at all steps of manufacturing ensures high reliability, accuracy and precision.

Removable Cap for Calibration

Calibration Tool

Specially designed calibration tool is provided for convenient and quick In-lab user re-calibration.
This is in compliance with GLO/ISO Norms.

PISTON

PTFE Piston with ETP O-Ring Ensures Very High Chemical Compatibility & Wiper Like Smooth, Effortless Piston Movement.

GLASS BARREL PROTECTION

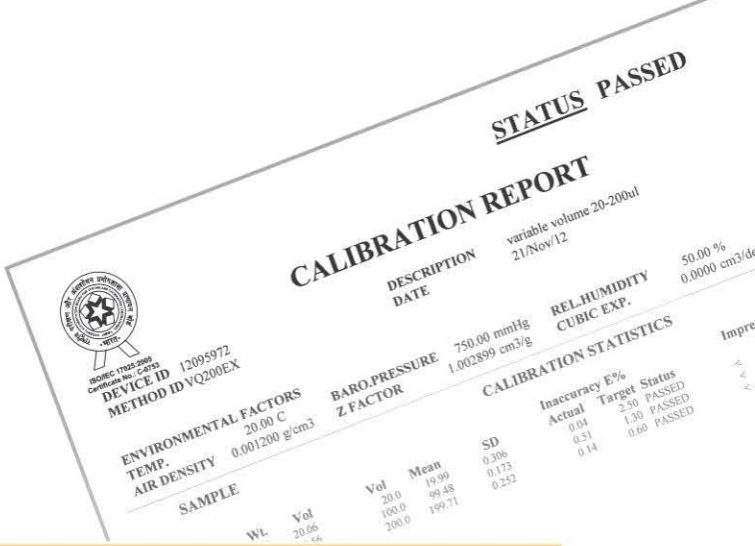
Glass Barrel is protected by a polypropylene sleeve. It also ensures no glass splitting in case of any accidental breakage.

NOZZLE CAP

Nozzle cap prevents any unwanted drop on the work space and avoids contact with hazardous chemicals.

VALVE MANIFOLD

Specially designed, springless, PTFE valve manifold ensures excellent chemical compatibility and leak proof valve functioning.



COMPONENT DESCRIPTION

Component	Description
Piston	PTFE & ETP
Cylinder	Glass
Volume Adjustment Knob	Screw Type
Valve Housing	PTFE
Valve Assembly	Glass Ball & Seat
Discharge Assembly	PTFE
Delivery Tube	FEP
Inlet Tube	FEP
Calibration	Individually calibrated and certified. In-lab easy Calibration by the user is also possible.
Accuracy & Reproducibility	In accordance with ISO 8655 standards.
Compatibility	Excellent compatibility with all reagents except HF

SPECIFICATIONS & ORDERING INFORMATION			ISO 8655 Specifications			
Model No.	Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± ml
BTDR-1	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005
BTDR-2	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
BTDR-3	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
BTDR-4	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
BTDR-5	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
BTDR-6	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200
BTDR-7	50-400 ml	5.0 ml	0.6	2.400	0.2	0.800

Satisfaction Guaranteed

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ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Microlit

Microlit

HIGH PRECISION MICROPIPETTES (RBO Series)

New body design with soft grip and improved ergonomy for more comfort and less fatigue during operation.

ASCB(E) Accrediting Certifying Body UK
ISO 13485

CE

GERMAN CERT
ISO 9001

VARIABLE VOLUME

FULLY AUTOCLAVABLE

In order to keep pace with the rapid progress made in research sector in recent years, MICROLIT has made one logical step further and proudly presents the new, high precision micropipette series for today's sophisticated users in the field of Molecular biology, Microbiology, Immunology, cell culture, Analytical Chemistry, Biochemistry, Genetics etc.

FEATURES :

- High quality spring mechanism ensures softer plunger movement.
- Nine volume ranges cover the complete pipetting range from 0.2 µl to 10 ml offering a wide choice to select the most suitable model for any application.

EASY VOLUME ADJUSTMENT :

Easy Volume Adjustment by simply turning the plunger. Plunger does not snag gloves.

UNIVERSAL TIPCONE :

Compatible with most of the internationally accepted standard tips.

VOLUME SETTING :

Soft click sound at every increment ensures perfect volume setting and no accidental volume change. It also facilitates single handed operation.

SOFT GRIP & ERGONOMIC DESIGN:

New body design with soft grip and improved ergonomy for more comfort and less fatigue during operation.

DIGITAL DISPLAY :

4 digit display with sub divisions provides small volume increments.

FIXED VOLUME

FULLY AUTOCLAVABLE

Fixed Volume Pipettes are designed for many different types of routine laboratory work. Using the same state-of-art design and basic features of Variable Volume Pipettes, these fixed volume pipettes are ideal for Clinical Diagnostics, Control Analysis etc.

COLOUR CODING :

Attractive colour coding for easy identification between different volume ranges.

LARGE GRIPPY :

Specially designed large grippy is provided for comfortable grip and ease during working.

TIP EJECTOR :

Built-in streamlined tip ejector facilitates easy tip ejection and access to narrow necked bottles and tubes.

USER ADJUSTMENT :

Re-calibration can be performed easily by the user.

MULTICHANNEL

MICROPIPETTES
FULLY AUTOCLAVABLE

Recommended for ELISA, Molecular screening, Kinetic studies, DNA amplifications etc.

8-CHANNEL

12-CHANNEL

TIP EJECTION KNOB :

Placement and good design allows easy single handed tip ejection.

PIPETTE HOLDER :

The holder provided with the pipette allows easy, efficient and safe storage.

EASY TIP EJECTION :

Specially designed sequential tip ejector allows effortless tip ejection.

OPERATION FLEXIBILITY :

Lower housing can be rotated 360° providing flexibility during operation.

SPECIFICATIONS & ORDERING INFORMATION

Fully Autoclavable Variable Volume Micropipettes

Model	Volume Range	Inc. µl	A		CV		Model	Volume Range	Inc. µl	A		CV	
			±%	±µl	±%	±µl				±%	±µl	±%	±µl
RBO-2	0.2 - 2.0µl	0.002	2	0.04	1.2	0.024	RBO-200	20 - 200µl	0.2	0.6	1.2	0.2	0.4
RBO-10	0.5 - 10µl	0.02	1	0.1	0.5	0.05	RBO-1000	100-1000µl	1.0	0.6	6	0.2	2
RBO-20	2 -20µl	0.02	0.8	0.16	0.4	0.08	RBO-5000	0.5-5 ml	10.0	0.6	30	0.2	10
RBO-50	5 - 50µl	0.1	0.8	0.4	0.4	0.2	RBO-10000	1-10ml	20.0	0.6	60	0.2	20
RBO-100	10 - 100µl	0.2	0.6	0.6	0.2	0.2							

Fully Autoclavable Fixed Volume Micropipettes

Model	Vol. µl	A		CV		Model	Vol. µl	A		CV	
		±%	±µl	±%	±µl			±%	±µl	±%	±µl
RBO-F-1	1.0	5	0.05	5	0.05	RBO-F-200	200.0	0.6	1.2	0.2	0.4
RBO-F-2	2.0	4	0.08	2	0.04	RBO-F-250	250.0	0.6	1.5	0.2	0.5
RBO-F-5	5.0	2	0.1	1	0.05	RBO-F-500	500.0	0.6	3	0.2	1
RBO-F-10	10.0	1	0.1	0.5	0.05	RBO-F-1000	1000.0	0.6	6	0.2	2
RBO-F-20	20.0	0.8	0.16	0.4	0.08	RBO-F-2000	2000.0	0.6	12	0.2	4
RBO-F-25	25.0	0.8	0.2	0.4	0.1	RBO-F-5000	5000.0	0.6	30	0.2	10
RBO-F-50	50.0	0.8	0.4	0.4	0.2	RBO-F-10000	10000.0	0.4	40	0.2	20
RBO-F-100	100.0	0.6	0.6	0.2	0.2						

8-channel Fully Autoclavable Micropipette

Model	Volume Range	Inc. µl	A		CV	
			±%	±µl	±%	±µl
RBO-MCA-8/10	0.5 - 10µl	0.02	1.6	0.16	1	0.1
RBO-MCA-8/20	02 - 20µl	0.02	0.8	0.16	0.4	0.08
RBO-MCA-8/50	5-50µl	0.1	0.8	0.4	0.4	0.2
RBO-MCA-8/100	10 - 100µl	0.2	0.8	0.8	0.3	0.3
RBO-MCA-8/200	20-200µl	0.2	0.8	1.6	0.3	0.6
RBO-MCA-8/300	40-300µl	0.2	0.8	2.4	0.3	0.9

12-channel Fully Autoclavable Micropipette

Model	Volume Range	Inc. µl	A		CV	
			±%	±µl	±%	±µl
RBO-MCA-12/10	0.5 - 10µl	0.02	1.6	0.16	1	0.1
RBO-MCA-12/20	02 - 20µl	0.02	0.8	0.16	0.4	0.08
RBO-MCA-12/50	5-50µl	0.1	0.8	0.4	0.4	0.2
RBO-MCA-12/100	10 - 100µl	0.2	0.8	0.8	0.3	0.3
RBO-MCA-12/200	20-200µl	0.2	0.8	1.6	0.3	0.6
RBO-MCA-12/300	40-300µl	0.2	0.8	2.4	0.3	0.9

Error limits according to the nominal capacity (= maximum volume) indicated on the instrument, obtained with instrument and distilled water at equilibrium with ambient temperature at 20 °C, and with smooth, steady operation. The error limits are well within the limits of DIN EN ISO 8655-2. (See Table 1) A = Accuracy, CV = Coefficient of variation.

Table 1- Maximum permissible errors as per ISO 8655-2

Nominal volume	Maximum permissible systematic error		Maximum permissible random error	
	±%	±µl	±%	±µl
1	5.0	0.05	5.0	0.05
2	4.0	0.08	2.0	0.04
5	2.5	0.125	1.5	0.075
10	1.2	0.12	0.8	0.08
20	1.0	0.2	0.5	0.1
50	1.0	0.5	0.4	0.2
100	0.8	0.8	0.3	0.3
200	0.8	1.6	0.3	0.6
500	0.8	4.0	0.3	1.5
1000	0.8	8.0	0.3	3.0
2000	0.8	16	0.3	6.0
5000	0.8	40	0.3	15.0
10000	0.6	60	0.3	30.0

Single Channel Fixed & Variable Volume Micropipettes : In the conformity test, the maximum permissible errors for the nominal volumes in Tables 1 apply to every selectable volume throughout the useful volume range of the piston pipette; i.e. the maximum permissible systematic errors of variable-volume piston pipette with a useful volume range of 10 µl to 100 µl are ± 0.8 µl and the maximum permissible random errors are ± 0.3 µl for every measured volume.

Multichannel Micropipettes : The maximum permissible systematic and random errors of multi-channel piston pipettes shall be equal to twice the values specified in Table 1 for single-channel piston pipettes. Each channel of the multi-channel piston pipette, considered independently, shall meet these specifications.

Satisfaction Guaranteed

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ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Microlit

Microlit

e-Burette

Motorized Titration

Focus on quality & reliability

50 ml

25 ml

10 ml

ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Features

- Motor controlled piston movement.
- Re-circulation system allows quick purging without loss of reagent
- Easy, user-friendly, TFT touchscreen guides you to perform quick and accurate titration.
- Three dispensing speeds including drop-wise dispensing allows you to achieve the end point very accurately.
- Dispensing can be performed by a touch of the screen and stops immediately when the touch is removed.
- 20 results can be saved in memory.
- Computer connectivity.
- Conforms to ISO 8655 standards.

SPECIFICATIONS & ORDERING INFORMATION

Model No.	Capacity	Increment	Accuracy		CV	
			±%	± µl	±%	± µl
TI - 10	10ml	0.002 ml	0.2	20	0.07	7
TI - 25	25ml	0.05 ml	0.2	50	0.07	17.5
TI - 50	50ml	0.01 ml	0.2	100	0.05	25

Microlit

629, Pakramau, Kursi Road, Lucknow -226 026, India

Tel : +91-9919963376, +91-9839014252

E-mail : info@microlit.com, ajayjain2801@gmail.com

Website : www.microlit.com

Microlit

Ofill
PIPETTE FILLING DEVICE

An universal Silicon collet is provided to accept all standard pipettes up to 100ml. Internal knurlings on the collet holds the pipette firmly.

ASCB(E) UK ISO 13485

CE

GERMAN CERT ISO 9001

Satisfaction Guaranteed

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ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Microlit

- An universal Silicon collet is provided to accept all standard pipettes up to 100ml. Internal knurlings on the collet holds the pipette firmly.
- In-line membrane filter (0.2 micron) prevents
    a. Aerosol Contamination
    b. Liquid from entering the equipment by accident.
- Ni-MH 3.6V rechargeable batteries are used in combination with low power consumption circuit and vacuum/pressure pump. Allows eight hours of continuous operation.
- Battery Charger is provided with all models.

- **Available in attractive colour combinations.**

NOTE : Battery Charger Supplied with the Instrument is Compatible with Both 220V and 110V.

Satisfaction Guaranteed

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ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Microlit

Microlit

ELECTRONIC MICROPIPETTE

Large Liquid Crystal Display

Two Line Alphanumeric LCD.

ASCB(E) UK
ISO 13485

CE

GERMAN CERT
ISO 9001

ELECTRONIC MICROPIPETTE

Microlit Electronic Pipette is based on Stepper Motor with Microprocessor controlled piston movement. These are user friendly and offer effortless pipetting. Accuracy & Precision levels are very high and user-independent. This is a complete solution for every pipetting need.

- User friendly software.
- Easy, User friendly calibration.
- Rechargeable during operation.
- Optimized ergonomy and working comfort.
- Large Liquid Crystal Display (LCD).
- Built-in tip ejector.
- Five models cover the complete pipetting range from 0.2 µl to 5000 µl.

SPECIFICATIONS & ORDERING INFORMATION

Electronic Micropipettes

Model	Volume Range µl	Inc. µl	Acc. ±%	Acc. ±µl	CV ±%	CV ±µl
ME-10	0.2-10	0.05	1.2	0.12	0.8	0.08
ME-120	5-120	0.5	0.8	0.96	0.3	0.36
ME-300	20-300	1.0	0.8	2.4	0.3	0.9
ME-1000	50-1000	5.0	0.8	8	0.3	3
ME-5000	100-5000	10.0	0.8	40	0.3	15

Error limits according to the nominal capacity (=maximum volume) indicated on the instrument, obtained with instrument and distilled water at equilibrium with ambient temperature at 20° C, and with smooth, steady operation. The Error limits are well within the limits of DIN EN ISO 8655.2.

(see table 1) A= Accuracy, CV=Coefficient of variation.

Table1 - Maximum permissible errors as per ISO 8655-2

Nominal Volume	ISO 8655 Specification Maximum Permissible Systematic Error ±%	ISO 8655 Specification Maximum Permissible Systematic Error ±µl	Microlit Specification Maximum Permissible Systematic Error ±%	Microlit Specification Maximum Permissible Systematic Error ±µl
10	1.2	0.12	0.8	0.08
100	0.8	0.8	0.3	0.3
200	0.8	1.6	0.3	0.6
500	0.8	4.0	0.3	1.5
1000	0.8	8.0	0.3	3.0
5000	0.8	40	0.3	15

FEATURES

Modes (Easy selection of modes from a single key)

- Standard mode
- Stepper mode
- Dilution mode
- Calibration mode

Variable Working Speeds

- Speed can be selected on a scale of 1-5.

Volume Selection

- Easy volume selection by 'UP' & 'DOWN' keys.

Large Fire Button

- Single 'FIRE BUTTON' for filling

Large Liquid Crystal Display

- Two line Alphanumeric LCD.

Built-in streamlined tip ejector

- For taken easy tip ejection and access to narrow naked bottles.

Calibration

- User friendly calibration mode facilitates easy calibration.

Battery

- 9V Ni-MH rechargeable batteries are used.
- 8 hours of operation with fully charged batteries.

Satisfaction Guaranteed

Microlit products are manufactured under strict quality control and GMP norms. However, if you are dissatisfied in any way with the operation of any Microlit product, call us or your nearest Microlit dealer for a free replacement.

ASCB(E) Accrediting Certifying Bodies
UK
ISO 13485

CE

GERMAN CERT
ISO 9001

Microlit

Microlit

LI'LPET

Two-step plunger operation facilitates super blow-out from the tip (last drop dispensing), resulting in very high accuracy & precision.

ISO 13485:2003

CE

ISO 9001:2008

MINIATURE FIXED VOLUME

MICROPIPETTES

LI'LPET - The little Giant

These low cost miniature fixed volume pipettes are specially designed for use with Diagnostic Kits.

High volume Li'lpets of 200 µl, 250 µl, 500 µl and 1000 µl are specially designed for routine Laboratory work.

Optimum Size

- Li'lpet is 130 mm in length which is an optimum size for user comfort during pipetting.
- Li'lpet is held like a pipette and not like a syringe !!

Fully Autoclavable

Li'lpet is fully autoclavable at 121°C , 15 psi for 10-15 mins.

SPECIFICATIONS & ORDERING INFORMATION

Miniature Fixed Volume

Model	Vol. µl	Acc. ±%	CV ±%
MM-5	5	2.5	1.5
MM-10	10	1.2	0.8
MM-20	20	1.0	0.5
MM-25	25	1.0	0.4
MM-50	50	1.0	0.4
MM-100	100	0.8	0.3
MM-200	200	0.8	0.3
MM-250	250	0.8	0.3
MM-500	500	0.8	0.3
MM-1000	1000	0.8	0.3

Note: Accuracy and CV conform to ISO 8655-2

Unique Tip-Cone

- The tip cone of Li'lpet (5µl, 10µl, 20µl) is designed to accept both regular 200µl tips or ultra micro tips upto 20µl.
- Use of Ultra micro tips for volumes upto 20µl enhances the accuracy and precision very significantly.

Two Step Plunger Operation

- This is a unique feature that makes Li'lpet a genuine miniature micropipette.
- This also allows the Li'lpet to be used for reverse pipetting and repetitive pipetting.

Strict Quality Control

Each pipette undergoes a strict quality control at every manufacturing stage. Each pipette is individually calibrated as per ISO 8655 standards. Batch calibration certificate is provided

OEM Option Available

Custom colors are available.

Various Packaging Options

- Pack of single Li'lpet.
- Pack of 10 Li'lpets.
- Bulk Pack of 25 or 100 Li'lpets.
- Custom packaging options are also available on request.

Satisfaction Guaranteed

Microlit products are manufactured under strict quality control and GMP norms. However, if you are dissatisfied in any way with the operation of any Microlit product, call us or your nearest Microlit dealer for a free replacement.

ASCB(E) Accrediting Certifying Bodies UK
ISO 13485:2003

CE

GERMAN CERT
ISO 9001:2008

Microlit

STANDS FOR MICROPIPETTES

Microlit Pipette stands are available in several designs for single channel and Multichannel pipettes. You can choose according to your requirement and application.

MS-I

MS-II

MS-III

MS-IV

MS-V

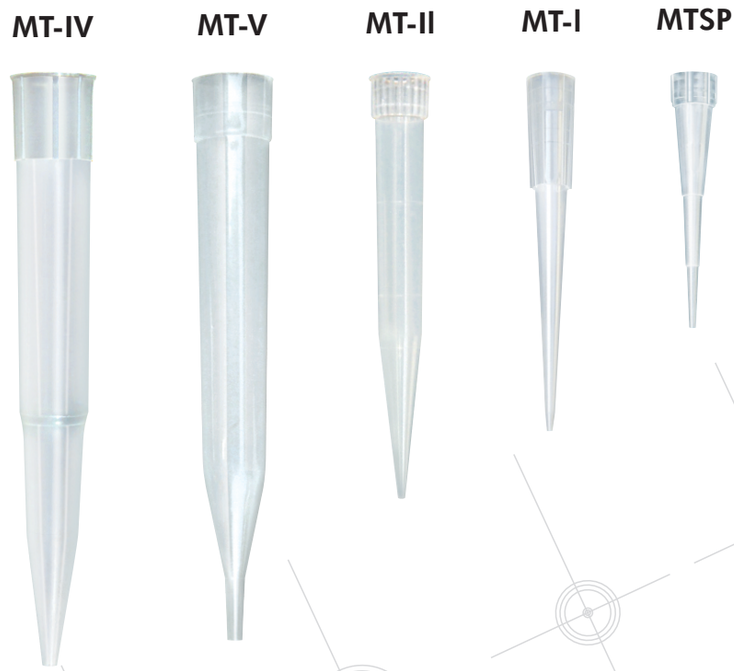
SPECIFICATIONS & ORDERING INFORMATION

Stands for Micropipettes

Model	Description
MS-I	Stand for three Pipettes
MS-II	Stand for six Pipettes
MS-III	Stand for 8-Channel Pipettes
MS-IV	Stand for 12-Channel Pipettes
MS-V	Stand for one Pipettes (Modular)

TIPS FOR MICROPIPETTES

Microlit high precision tips are available in all sizes. We recommend use of Microlit Tips with Microlit Pipettes for best results.



SPECIFICATIONS & ORDERING INFORMATION

Tips for Micropipettes

Model	Description
MTSP	Capacity upto 10 µl Pkt. of 100 Nos.
MT-I	Capacity upto 200 µl Pkt. of 1000 Nos.
MT-II	Capacity upto 1000 µl Pkt. of 1000 Nos.
MT-V	Capacity upto 5000 µl Pkt. of 100 Nos.
MT-IV	Capacity upto 10000 µl Pkt. of 100 Nos.

Superior chemical compatibility

PFA, PTFE and borosilicate glass components for use with a wide range of harsh chemicals

Chemicals A - Z	
A	
Acetaldehyde (Ethanal)	A
Acetic acid 96%	A
Acetic acid 100% (glacial)	B/4
Acetic anhydride	B/4
Acetone (Propanone)	B/4
Acetonitrile (MECN)	B/4
Acetophenone	B/4
Acetyl Chloride	B/4
Acetylacetone	A
Acrylic acid	A
Acrylonitrile	B/4
Adipic acid	C/1
Allyl alcohol	A
Aluminum chloride	C/1
Amino acids	C/1
Ammonia 20%	B/4
Ammonia 20-30%	B/4
Ammonium chloride	C/1
Ammonium fluoride	C/1
Ammonium molybdate	C/1
Ammonium sulfate	C/1
Amyl alcohol (Pentanol)	A
Amyl chloride (Chloropentane)	B/4
Aniline	A
Ascorbic acid	C/1
n-Amyl acetate	B/4
B	
Barium chloride	C/1
Benzaldehyde	A
Benzene	B/4
Benzine	A
Benzoyl chloride	B/4
Benzyl alcohol	A
Benzyl chloride	B/4
Bis(2-ethylhexyl) phthalate	B/4
Boric acid 10%	B/1
Bromine	C/4
Bromobenzene	B/4
Bromonaphtalene	A
Butanediol	B/1
Butanol	A
Butanone (MEK)	B/4
Butyl acetate	B/4
Butyl methyl ether	B/4
Butylamine	B/4
Butyric acid	B/4
C	
Calcium carbonate	C/1
Calcium chloride	C/1
Calcium hydroxide	C/1
Calcium hypochlorite	C/1
Carbon disulfide	B/4
Carbon tetrachloride	B/4
Chlorine dioxide	B/4
Chlorine water	B/4
Chloro naphthalene	B/4
Chloroacetaldehyde 45%	B/1
Chloroacetic acid	B/1
Chloroacetone	B/4
Chlorobenzene	B/4
Chlorobutane	B/4
Chloroethanol	B/4
Chloroform	B/4
Nitro-hydrochloric acid (Aqua regia)	B/4
Chlorosulfonic acid	B/4
Chlorosulfuric acid 100%	B/3/4
Chromic acid 100%	B/3/4
Chromosulfuric acid 100%	C/1/3/4
Citric acid	B/1
Copper fluoride	C/1
Copper sulfate	C/1
Cresol	B/1
Cumene (Isopropylbenzene)	B/4
Cyanoacrylate	C/1
Cyclohexane	B/4
Cyclohexanone	B/4
Cyclopentane	B/4

D	
1,2-Diethylbenzene	B/4
1,4-Dioxane (Diethylene dioxide)	B/4
1-Decanol	A
Decane	A
Di-(2-ethylhexyl) peroxydicarbonate	B/4
Dibenzyl ether	B/4
Dichloroacetic acid	A
Dichlorobenzene	A
Dichloroethane	A
Dichloroethylene	B/4
Diesel oil (Heating oil)	A
Diethanolamine	A
Diethylamine	B/4
Diethylene glycol	A
Diethylether	B/4
Dimethyl sulfoxide (DMSO)	B/1/4
Dimethylaniline	A
Dimethylformamide (DMF)	B/4
E	
Ethanol	A
Ethanolamine	B/4
Ether	B/4
Ethyl acetate	B/4
Ethylbenzene	B/4
Ethylene chloride	B/4
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/1/4
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/4
Glycerin <40%	A
Glycolic acid 50%	B/1
H	
Heating oil (Diesel oil)	A
Heptane	A
Hexane	A
Hexanoic acid	B/1
Hexanol	A
Hydriodic acid	B/4
Hydrobromic acid	A
Hydrochloric acid 20% (HCl)	A
Hydrochloric acid 37% (HCl)	B/3
Hydrofluoric acid (HF)	C/5
Hydrogen peroxide	A
I	
Iodine	C/1
Iodine bromide	C/4
Iodine chloride	C/4
Isoamyl alcohol	A
Isobutanol	A
Isooctane	A
Isopropanol	A
Isopropyl ether	B/4
Iso-propylamine	B/4
L	
Lactic acid	C/1
M	
2-Methoxyethanol	A
Methanol	A
Methoxybenzene (Anisol)	B/4
Methyl benzoate	B/1/4
Methyl chloride (Chloromethane)	B/4
Methyl formate	A
Methyl iodide (Iodomethane)	B/4
Methyl methacrylate (MMA)	B/4
Methyl propyl ketone (2-Pentanone)	A
Methyl tert-butyl ether	B/4
Methylene chloride (Dichloromethane) (DCM)	B/4
Methylpentanone	A
Mineral oil (engine oil)	A
Monochloroacetic acid	B/1
N	
N-Butylamine	B/4
Nitric acid 100%	C/3/4

Nitric acid 30-70%	B/4
Nitric acid dil. <30%	B/4
Nitrobenzene	B/4
Nitromethane	B/4
N-methyl-2-pyrrolidone (NMP)	A
O	
Octane	A
Octanol	A
Oil (vegetable, animal)	B/4
Oil of turpentine	B/4
Oleic acid	B/1
Oxalic acid	C/1
P	
Pentane	B/4
Peracetic acid	A
Perchloric acid 100%	B/4
Perchloric acid diluted	A
Perchloroethylene	B/4
Petroleum	B/4
Petroleum ether / spirit	B/4
Phenol	A
Phenylethanol	B/4
Phenylhydrazine	B/1/4
Phosphoric acid 100%	A
Phosphoric acid 85%	A
Piperidine	B/4
Potassium chloride	C/1
Potassium dichromate	C/1
Potassium hydroxide	C/1
Potassium iodide	C/1
Potassium permanganate	C/1
Potassium peroxydisulfate (persulfate)	C/1
Potassium sulfate	C/1
Propionic acid (Propanoic acid)	A
Propylene glycol (Propane-1,2-diol)	A
Propylene oxide	A
Pyric acid (Trinitrophenol)	B/4
Pyridine	B/4
Pyruvic acid	B/1
R	
Resorcin	C/1
S	
Salicylaldehyde	A
Scintilation fluid	A
Silver acetate	C/1
Silver nitrate	C/1
Sodium acetate	C/1
Sodium chloride (kitchen salt)	C/1
Sodium dichromate	C/1
Sodium fluoride	C/1
Sodium hydroxide 30%	C/1
Sodium hypochlorite	C/1
Sodium thiosulfate	C/1
Sulfonitric acid 100%	B/3/4
Sulfur dioxide	B/4
Sulfuric acid 100%	B/4
T	
1,1,2-Trichlortrifluoroethane	B/4
Tartaric acid	C/1
Tetrachlorethylene	B/4
Tetrahydrofuran (THF)	B/4
Tetramethylammonium hydroxide	C/1/4
Toluene	B/4
Trichlorethylene	B/4
Trichloroacetic acid	B/1/4
Trichlorobenzene	B/4
Trichloroethane	B/4
Trichloromethane (Chloroform)	B/4
Triethanolamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/4
Trifluoromethane (Fluoroform)	B/4
U	
Urea	C/1
X	
Xylene	B/4
Z	
Zinc chloride 10%	C/1
Zinc sulfate 10%	C/1

Code explanations

A = Good resistance B = Acceptable with limitations C = Not recommended

1 = Possible crystallisation - blockage or possible coating peeling

2 = Swelling of plunger, possible peeling.

3 = Acid vapours (better resistance with lower concentration).

Rinse the instrument in the ri

4 = Risk of damage, softening or

Rinse the instrument in the rinse mode otherwise do not leave instrument on bottle.

5 = Chemical degradation of glass parts (plunger/barrel).

SPECIFICATIONS & ORDERING INFORMATION

Miniature Fixed Volume

Model	Vol. µl	Acc. ±%	CV ●%
MM-5	5	1.5	1.0
MM-10	10	1.0	1.0
MM-20	20	0.5	0.5
MM-25	25	0.5	0.5
MM-50	50	0.4	0.3
MM-100	100	0.3	0.3
MM-200	200	0.5	0.5
MM-250	250	0.5	0.5
MM-500	500	0.5	0.5
MM-1000	1000	0.5	0.5

Operation Manual

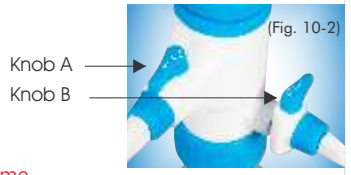
BOTTLE TOP DISPENSER

2. DISPENSING :

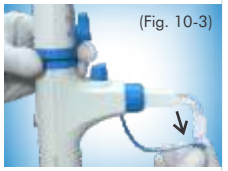
⚠ Wear protective clothing, eye protection and gloves. Liquid may accumulate in the cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations.

1. STANDARD DISPENSING

POSITION - Knob A - Open
Knob B - Closed (Fig 10-2)

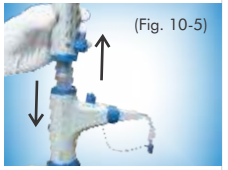


⚠ Before starting dispensing make sure that the dead volume is removed. Refer to article 11 of this manual.



- Remove cap from the discharge tube. (Fig. 10-3)

- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel. (Fig. 10-4)



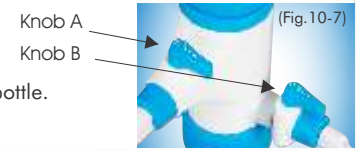
- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 10-5)

- Wipe off the discharge tube against the inner wall of the receiving vessel.
- Reattach cap to discharge tube. (Fig.10-6)

2. BOTTLE RE-FILLING

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

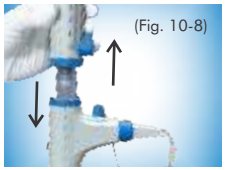
POSITION - Knob A - Closed
Knob B - Open (Fig.10-7)



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

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

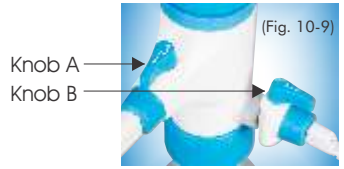
- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 10-8)
- Bottle will be refilled with the liquid from the second bottle.



3. RINSING :

NOTE - This feature is designed to rinse the dispenser with distilled water without dismounting the dispenser.

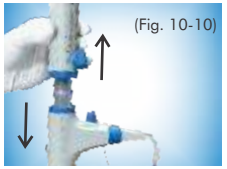
POSITION - Knob A - Open
Knob B - Open (Fig.10-9)



⚠ Make sure the second liquid is Distilled Water.

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

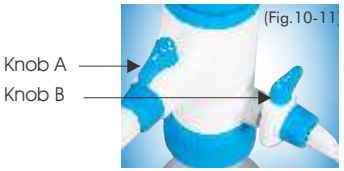
- Set the volume adjustment knob to maximum volume.
- Remove cap from the discharge tube. (Fig. 10-3)
- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel. (Fig. 10-4)
- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 10-10)



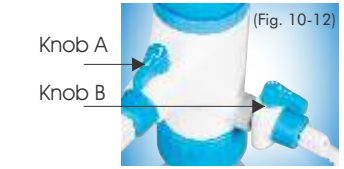
- Run the rinse cycle at least twice.
- Wipe off the discharge tube against the inner wall of the receiving vessel.

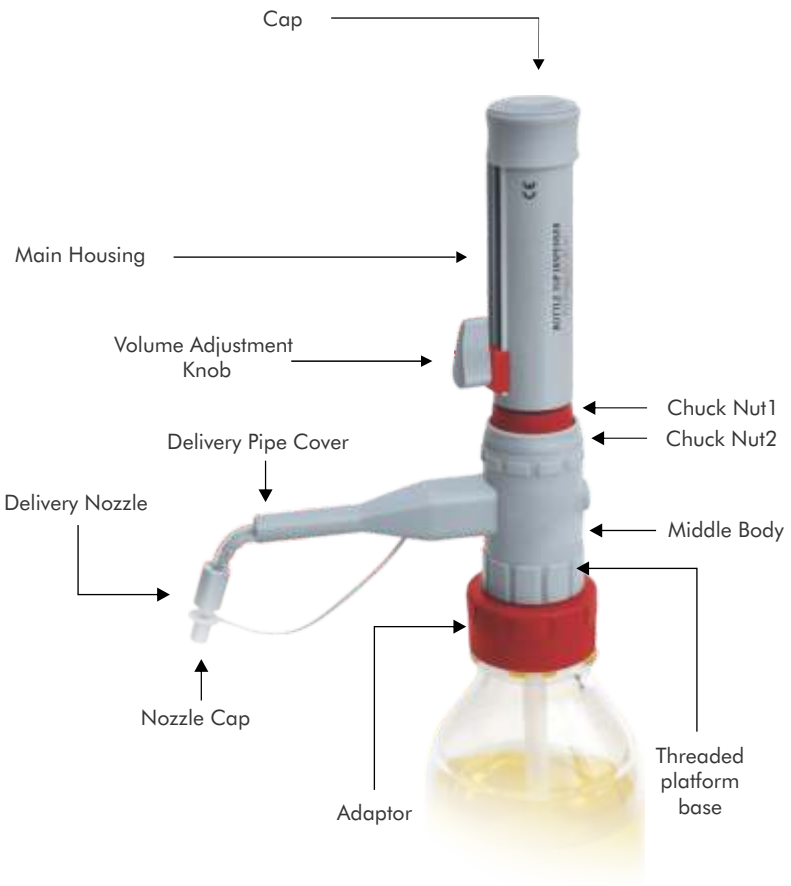
4. DUAL REAGENT DISPENSING :

POSITION 1 - Knob A - Open
Knob B - Closed (Fig. 10-11)



POSITION 2 - Knob A - Open
Knob B - Open (Fig. 10-12)





First Steps

Is everything in the package ? Confirm that package includes :

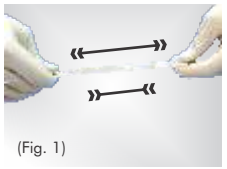
Bottle Top Dispenser, discharge tube, telescoping filling tube, calibration tool, different bottle adapters, a calibration certificate and this operation manual.

All dispensers will have the following adapters : 28, 32, 36, 40 & 45 mm.

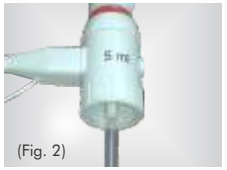
Assembly

⚠ Wear protective clothing, eye protection and gloves. Follow all Safety instruction and observe limitations of use and operating limitations. (see page 2)

1. Adjust length of telescoping inlet tube.
   The length of FEP inlet tubing provided should be adjusted to fit your particular reservoir. Longer length of inlet tube are available on request. (Fig. 1)


(Fig. 1)

2. Fix the telescoping tube. (Fig. 2)


(Fig. 2)

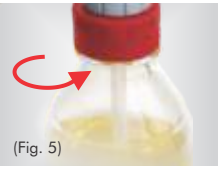
3. Choose the correct adapter for the bottle.
   The threaded platform base of dispenser has a 30 mm screw thread. Four adapters are supplied to suit containers with a 28, 32, 36, 40, 45 mm and 30 mm (inbuilt adapter) screw neck. (Fig. 3)


(Fig. 3)

4. Fix the adapter. (Fig. 4)


(Fig. 4)

5. Mount the dispenser :
   The assembled dispenser is screwed to the reservoir using gentle hand torque applied to the threaded platform base only. Removal should also be by means of hand torque applied to the same base. (Fig. 5)
6. Ready to Use.


(Fig. 5)

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

Ultimus

Bottle Top Dispenser

(Dual Inlet Technology)

Operation Manual

Scan the QR Code below for the *ULTIMUS* Video.

Microlit

TABLE OF CONTENTS

1. Intended Use Of The Instrument

The Bottle Top Dispenser is a general purpose laboratory instrument intended for use in laboratories for dispensing reagents and chemicals which are compatible with the instrument. (see page 4)

2. Safety Instructions

This instrument may sometimes be used with hazardous materials, operations and equipments. 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 responsibility of the user of this instrument to consult and establish appropriate safety and health practice 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 built up 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. (see page 2) Observe operating exclusions. 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 closure is attached.
8). Never remove the discharge tube while the dispensing cylinder is filled.
9). Reagents can accumulate in the cap of the discharge tube. Thus, it should be cleaned regularly.
10). Never carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may also lead to personal injury from chemicals.
11). Never use force on the instrument. Use smooth gentle movements to operate the piston upwards and downwards. Use only original manufacturer's accessories and spare parts.
12). Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the operating manual.
13). Always check the instrument for visual damage before use.
14). If there is a sign of a potential malfunction (e.g. piston difficult to move, sticking valve or leakage). immediately stop dispensing. Consult the 'Troubleshooting' section of this manual and contact the manufacturer if needed. (see page 20)

4. Functions and Limitations of Use

The bottle top dispenser is designed for dispensing liquids directly from the reservoir bottle. The instrument is calibrated according to the requirements 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.

Limitations of use :

- This instrument is designed for dispensing liquids, observing the following physical limits:
- Use temperature from +15°C to +40°C (from 59°F to 104°F) of instrument and reagent
- Vapor pressure up to max. 600 mbar. Aspirate slowly above 300 mbar, in order to prevent the liquid from boiling.
- Kinematic viscosity 500 mm^2
  (dynamic viscosity [mPas] = kinematic viscosity [mm^2 /s] x density [g/cm^3])
- Density: up to 2.2 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). If the piston becomes difficult to move, the instrument should be cleaned immediately. (see page 15)
When dispensing inflammable media, make sure to avoid buildup of static charge, e.g. do not dispense into plastic vessels, do not wipe instrument with a dry cloth.
The Dispenser is designed for general laboratory applications and complies with the relevant standards, e.g. DIN EN ISO 8655. Compatibility of the instrument for a specific application (e.g. trace material analysis, food sector etc.) must be checked by the user. Approvals for specific applications, e.g. for production and administration of food, pharmaceuticals and cosmetics are not available.

4. Operating Exclusions

Never use with:

Liquids attacking FEP, PFA and PTFE (e.g. dissolved sodium azide*)

Liquids attacking 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 solid particles may clog or damage the instrument

Liquids attacking PP (cap)**

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

** Liquids attacking PP (cap)

5. Storage Conditions

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

6. Chemical Resistance

Chemicals from A to Z

The following list includes most frequently used chemicals. It provides useful information for the safe and adequate use of the Dispenser. However, safety precautions and recommendations in operating instructions must be followed carefully.

Code explanations

A = Good resistance B = Acceptable with limitations C = Not recommended

1 = Possible crystallisation - blockage or possible coating peeling

2 = Swelling of plunger, possible peeling.

3 = Acid vapours (better resistance with lower concentration).
Rinse the instrument in the rinse mode otherwise do not leave instrument on bottle.

4 = Risk of damage, softening or discoloration of external parts through vapours.
Rinse the instrument in the rinse mode otherwise do not leave instrument on bottle.

5 = Chemical degradation of glass parts (plunger/barrel).

List of Reagents

Chemicals A - Z

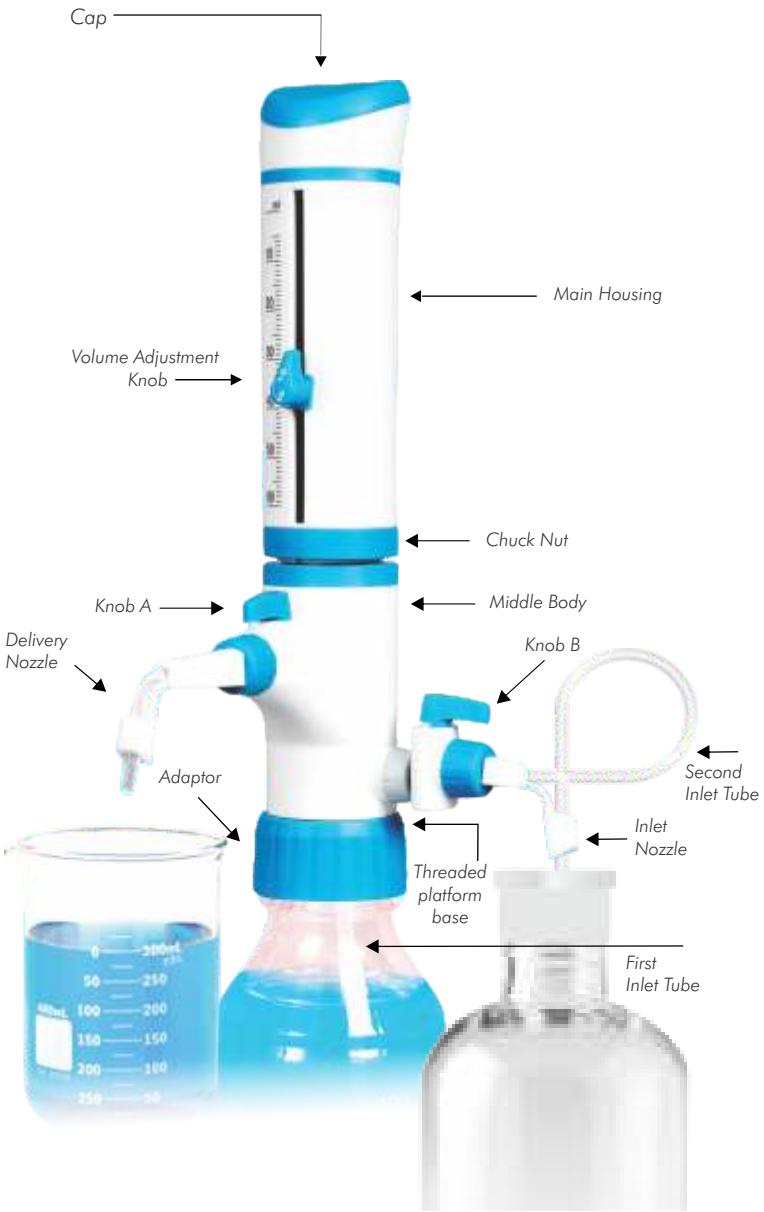
A	
Acetaldehyde (Ethanal)	A
Acetic acid 96%	A
Acetic acid 100% (glacial)	B/4
Acetic anhydride	B/4
Acetone (Propanone)	B/4
Acetonitrile (MECN)	B/4
Acetophenone	B/4
Acetyl Chloride	B/4
Acetylacetone	A
Acrylic acid	A
Acrylonitrile	B/4
Adipic acid	C/1
Allyl alcohol	A
Aluminum chloride	C/1
Amino acids	C/1
Ammonia 20%	B/4
Ammonia 20-30%	B/4
Ammonium chloride	C/1
Ammonium fluoride	C/1
Ammonium molybdate	C/1
Ammonium sulfate	C/1
Amyl alcohol (Pentanol)	A
Amyl chloride (Chloropentane)	B/4
Aniline	A
Ascorbic acid	C/1
n-Amyl acetate	B/4
B	
Barium chloride	C/1
Benzaldehyde	A
Benzene	B/4
Benzine	A
Benzoyl chloride	B/4
Benzyl alcohol	A
Benzyl chloride	B/4
Bis(2-ethylhexyl) phthalate	B/4
Boric acid 10%	B/1
Bromine	C/4
Bromobenzene	B/4
Bromonaphtalene	A
Butanediol	B/1
Butanol	A
Butanone (MEK)	B/4
Butyl acetate	B/4
Butyl methyl ether	B/4
Butylamine	B/4
Butyric acid	B/4

Chemicals A - Z	
C	
Calcium carbonate	C/1
Calcium chloride	C/1
Calcium hydroxide	C/1
Calcium hypochlorite	C/1
Carbon disulfide	B/4
Carbon tetrachloride	B/4
Chlorine dioxide	B/4
Chlorine water	B/4
Chloro naphthalene	B/4
Chloroacetaldehyde 45%	B/1
Chloroacetic acid	B/1
Chloroacetone	B/4
Chlorobenzene	B/4
Chlorobutane	B/4
Chloroethanol	B/4
Chloroform	B/4
Nitro-hydrochloric acid (Aqua regia)	B/4
Chlorosulfonic acid	B/4
Chlorosulfuric acid 100%	B/3/4
Chromic acid 100%	B/3/4
Chromosulfuric acid 100%	C/1/3/4
Citric acid	B/1
Copper fluoride	C/1
Copper sulfate	C/1
Cresol	B/1
Cumene (Isopropylbenzene)	B/4
Cyanoacrylate	C/1
Cyclohexane	B/4
Cyclohexanone	B/4
Cyclopentane	B/4
D	
1,2-Diethylbenzene	B/4
1,4-Dioxane (Diethylene dioxide)	B/4
1-Decanol	A
Decane	A
Di-(2-ethylhexyl) peroxydicarbonate	B/4
Dibenzyl ether	B/4
Dichloroacetic acid	A
Dichlorobenzene	A
Dichloroethane	A
Dichloroethylene	B/4
Diesel oil (Heating oil)	A
Diethanolamine	A
Diethylamine	B/4
Diethylene glycol	A
Diethylether	B/4
Dimethyl sulfoxide (DMSO)	B/1/4
Dimethylaniline	A
Dimethylformamide (DMF)	B/4

Chemicals A - Z	
E	
Ethanol	A
Ethanolamine	B/4
Ether	B/4
Ethyl acetate	B/4
Ethylbenzene	B/4
Ethylene chloride	B/4
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/1/4
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/4
Glycerin <40%	A
Glycolic acid 50%	B/1
H	
Heating oil (Diesel oil)	A
Heptane	A
Hexane	A
Hexanoic acid	B/1
Hexanol	A
Hydriodic acid	B/4
Hydrobromic acid	A
Hydrochloric acid 20% (HCl)	A
Hydrochloric acid 37% (HCl)	B/3
Hydrofluoric acid (HF)	C/5
Hydrogen peroxide	A
I	
Iodine	C/1
Iodine bromide	C/4
Iodine chloride	C/4
Isoamyl alcohol	A
Isobutanol	A
Isooctane	A
Isopropanol	A
Isopropyl ether	B/4
Iso-propylamine	B/4
L	
Lactic acid	C/1
M	
2-Methoxyethanol	A
Methanol	A
Methoxybenzene (Anisol)	B/4
Methyl benzoate	B/1/4
Methyl chloride (Chloromethane)	B/4
Methyl formate	A

Methyl iodide (Iodomethane)	B/4
Chemicals A - Z	
M	
Methyl methacrylate (MMA)	B/4
Methyl propyl ketone (2-Pentanone)	A
Methyl tert-butyl ether	B/4
Methylene chloride (Dichloromethane) (DCM)	B/4
Methylpentanone	A
Mineral oil (engine oil)	A
Monochloroacetic acid	B/1
N	
N-Butylamine	B/4
Nitric acid 100%	C/3/4
Nitric acid 30-70%	B/4
Nitric acid dil. <30%	B/4
Nitrobenzene	B/4
Nitromethane	B/4
N-methyl-2-pyrrolidone (NMP)	A
O	
Octane	A
Octanol	A
Oil (vegetable, animal)	B/4
Oil of turpentine	B/4
Oleic acid	B/1
Oxalic acid	C/1
P	
Pentane	B/4
Peracetic acid	A
Perchloric acid 100%	B/4
Perchloric acid diluted	A
Perchloroethylene	B/4
Petroleum	B/4
Petroleum ether / spirit	B/4
Phenol	A
Phenylethanol	B/4
Phenylhydrazine	B/1/4
Phosphoric acid 100%	A
Phosphoric acid 85%	A
Piperidine	B/4
Potassium chloride	C/1
Potassium dichromate	C/1
Potassium hydroxide	C/1
Potassium iodide	C/1
Potassium permanganate	C/1
Potassium peroxydisulfate (persulfate)	C/1
Potassium sulfate	C/1
Propionic acid (Propanoic acid)	A
Propylene glycol (Propane-1,2-diol)	A
Propylene oxide	A
Pyric acid (Trinitrophenol)	B/4
Pyridine	B/4

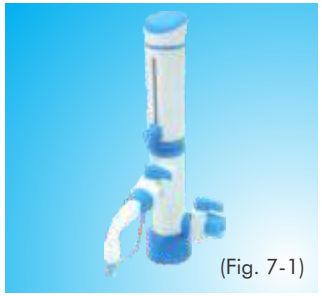
Chemicals A - Z	
P	
Pyruvic acid	B/1
R	
Resorcin	C/1
S	
Salicylaldehyde	A
Scintilation fluid	A
Silver acetate	C/1
Silver nitrate	C/1
Sodium acetate	C/1
Sodium chloride (kitchen salt)	C/1
Sodium dichromate	C/1
Sodium fluoride	C/1
Sodium hydroxide 30%	C/1
Sodium hypochlorite	C/1
Sodium thiosulfate	C/1
Sulfonitric acid 100%	B/3/4
Sulfur dioxide	B/4
Sulfuric acid 100%	B/4
T	
1,1,2-Trichlortrifluoroethane	B/4
Tartaric acid	C/1
Tetrachlorethylene	B/4
Tetrahydrofuran (THF)	B/4
Tetramethylammonium hydroxide	C/1/4
Toluene	B/4
Trichlorethylene	B/4
Trichloroacetic acid	B/1/4
Trichlorobenzene	B/4
Trichloroethane	B/4
Trichloromethane (Chloroform)	B/4
Triethanolamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/4
Trifluoromethane (Fluoroform)	B/4
U	
Urea	C/1
X	
Xylene	B/4
Z	
Zinc chloride 10%	C/1
Zinc sulfate 10%	C/1



7. First Steps

Is everything in the package ? Confirm that package includes :

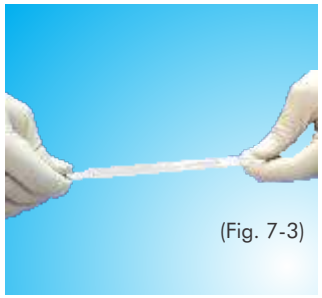
- Bottle Top Dispenser (Fig. 7-1)


(Fig. 7-1)

- Second inlet tube (Fig. 7-2)


(Fig. 7-2)

- Telescoping filling tube (Fig. 7-3)


(Fig. 7-3)

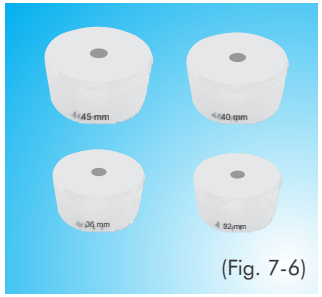
- Calibration tool (Fig. 7-4)


(Fig. 7-4)

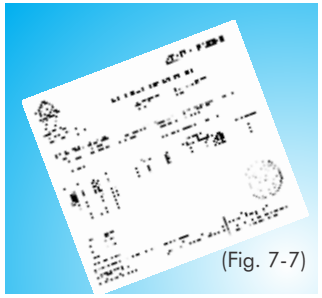
- Bottle Adapters - 28, 32, 36, 40 & 45 mm. (Fig. 7-5)


(Fig. 7-5)

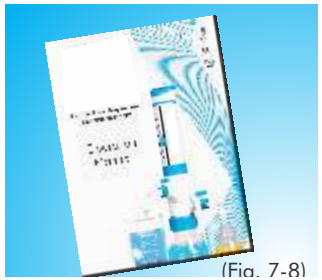
- Bottle Adapters for the second bottle - 32, 36, 40 & 45 mm. (Fig. 7-6)


(Fig. 7-6)

- Calibration Certificate (Fig. 7-7)


(Fig. 7-7)

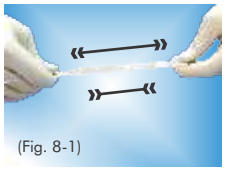
- Operation manual. (Fig. 7-8)


(Fig. 7-8)

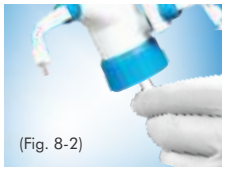
8. Assembly

⚠ Wear protective clothing, eye protection and gloves. Follow all Safety instruction and observe limitations of use and operating limitations. (see page 2)

1. Adjust length of telescoping inlet tube.
   The length of FEP inlet tubing provided should be adjusted to fit your particular reservoir. Longer length of inlet tube 1 are available on request. (Fig. 8-1)


(Fig. 8-1)

2. Fix the telescoping inlet tube 1. (Fig. 8-2)


(Fig. 8-2)

3. Choose the correct adapter for the bottle.
   The threaded platform base of dispenser has a 30 mm screw thread in 2.5, 5 & 10 ml dispenser and 45 mm screw thread in 30, 60 & 100 ml dispenser. In case of 30, 60 & 100 ml dispenser, a reducer is pre fitted to fix the extra adapters. If a GL 45 bottle neck is used then the reducer can be removed and dispenser can be mounted directly. Five adapters are supplied to suit containers with a 28, 32, 36, 40, 45 mm and 30 mm (inbuilt adapter) screw neck. (Fig. 8-3)


(Fig. 8-3)

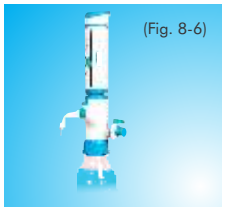
4. Fix the adapter. (Fig. 8-4)


(Fig. 8-4)

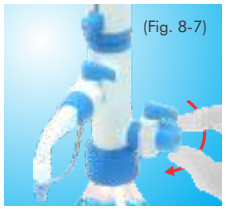
5. Mount the dispenser with first inlet tube attached :
   The assembled dispenser is screwed to the reservoir using gentle hand torque applied to the threaded platform base only. Removal should also be by means of hand torque applied to the same base. (Fig. 8-5)


(Fig. 8-5)

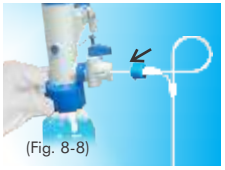
6. The dispenser with the first inlet will look as in (Fig. 8-6).


(Fig. 8-6)

7. For the Assembly of the second inlet B, first remove the cap on the Inlet B. (Fig. 8-7)


(Fig. 8-7)

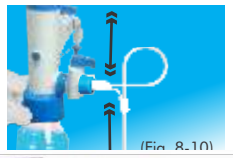
8. Insert the extension tube attachment into the hole of the Inlet B. Push the tube to ensure the tight fitment. (Fig. 8-8)


(Fig. 8-8)

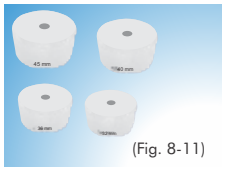
9. Screw the chuck nut on the extension tube to tightly secure the inlet pipe. (Fig. 8-9)


(Fig. 8-9)

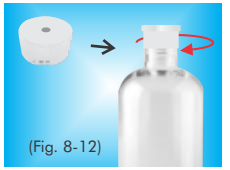
10. The Inlet Tube B can now be extended or reduced depending on the depth of the Bottle. (Fig. 8-10)


(Fig. 8-10)

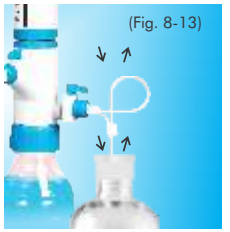
11. To use the second inlet B, there is an additional set of adapters/caps to mount on the second bottle to avoid any exposure to air and fumes. (Fig. 8-11)


(Fig. 8-11)

12. Mount the correct cap on the second bottle by screwing it on. (Fig. 8-12)


(Fig. 8-12)

13. Now the extension tube can be passed through the hole on the cap of the second bottle. (Fig. 8-13)


(Fig. 8-13)

14. The instrument is now ready for use. (Fig. 8-14)


(Fig. 8-14)

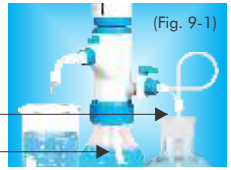
⚠ Do not operate the piston until the unit is safely and fully mounted on the reservoir bottle.
Always wear protective gloves when touching the instrument or the bottle, especially when
⚠ using dangerous liquids. When mounted to a reagent bottle, always carry the instrument as shown in the figure. (8-14)

⚠ Never press down the piston when the cap is on. (Fig. 9-2)
The reagent can drip out from the discharge tube and cap.

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

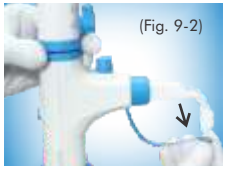
9. Priming

⚠ In this dispenser two inlet paths, A and B, have to be primed. (Fig.9-1)

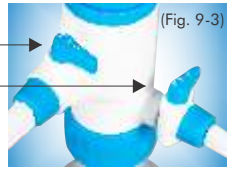


- Open the cap of the dispensing tube. (Fig. 9-2)

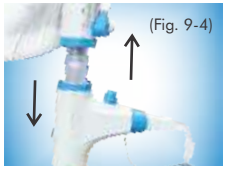
⚠ For safety hold the discharge tube orifice on the inner wall of a suitable receiving vessel.



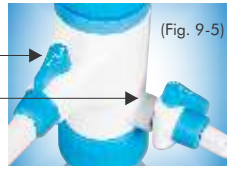
INLET A
POSITION - Knob A - Closed
Knob B - Closed. (Fig.9-3)



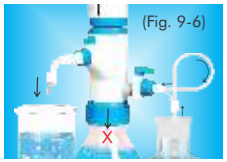
- For priming gently pull up the piston approx, 30mm and push it down rapidly until the lower stop.
- Repeat this procedure 5 times (Fig. 9-4).



INLET B
POSITION - Knob A - Open
Knob B - Open (Fig. 9-5)

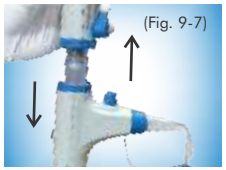


NOTE - Now the liquid will flow from the second bottle to the outside without any interaction with the liquid in the first bottle. (Fig. 9-6)



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

- Gently pull up the piston approx, 30mm and push it down rapidly until the lower stop.
- Repeat this procedure 5 times. (Fig. 9-7)



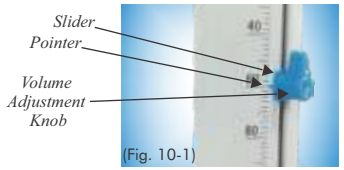
NOTE - In case the liquid in the second bottle is the same as the liquid in the first bottle then close the Knob A and open the Knob B. The liquid will flow from the second bottle into the first bottle for re-filling. After a few dispense cycles the second inlet will be primed as well and no liquid will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

⚠ 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.

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

10. Dispensing

1. VOLUME SETTING :



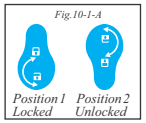
Volume Adjustment Knob :

It is simple and easy to operate. There are two positions of the knob as shown in Fig. 10-1-A

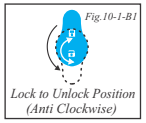
Position 1 : Locked Position | Position 2 : Unlocked Position

Setting the Volume :

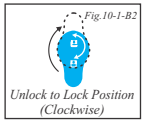
Follow these simple steps :



- Turn the Knob from Position 1 to Position 2 by rotating it ANTICLOCKWISE as shown in Fig. 10-1-B1.



- The slider is now loose and can be moved up and down.
- Set your desired volume by aligning the pointer with the scale.
- To lock the set volume, turn the Knob from Position 2 to Position 1 by rotating it CLOCKWISE as shown in Fig. 10-1-B2 .



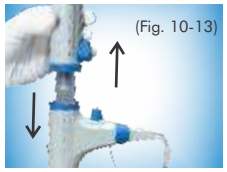
POSITION 2 dispenses the liquid from the second bottle to the outside.

NOTE - This feature enables the user to use two reagents with one dispenser without dismounting the dispenser.

⚠ 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 article 11 of this manual.

- Remove cap from the discharge tube. (Fig. 10-3)
- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel. (Fig. 10-4)
- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 10-13)


(Fig. 10-13)

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

⚠ IMPORTANT

When switching from Position 1 to 2 or from Position 2 to 1, 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:

a. Switch to Position 1/2 (depending on mode needed).
b. Take a new receiving vessel to take out the dead volume/waste reagent out.
c. Set the volume to 3ml for 2.5ml, 5ml and 10ml dispensers.
   Set the volume to 5ml for 30ml, 60ml and 100ml dispensers.
d. Execute one cycle of dispensing. (Two cycles are advised to be completely sure that the complete dead volume is removed.)
e. Remove the second vessel (waste collection vessel).
f. Dispenser is ready to dispense the second reagent.

12. Error Limits

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

Error Limits for First & Second Liquid		Specifications ISO 8655			
Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± 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

Dispenser has been laboratory calibrated at its nominal volume. However, due to changes in environmental conditions and the viscosity of the media which you dispense, we recommend gravimetric testing every 3-12 months. Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 13) is performed as follows:

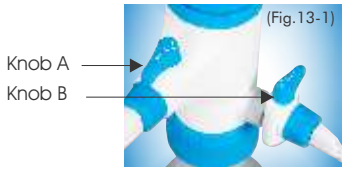
Re-Calibrate :

⚠ Make sure that the instrument is primed.

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

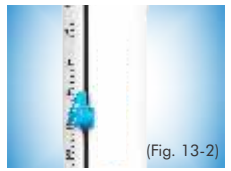
1. Set the dispenser to STANDARD DISPENSING mode.

POSITION - Knob A - Open
Knob B - Closed (Fig. 13-1)



(Fig.13-1)

2. Set the Dispenser to the nominal volume or any other volume which is most commonly used by you. (Fig. 13-2) Follow the common rules for calibration used in statistical quality control (ISO 8655/2).


(Fig. 13-2)

3. Set the volume and dispense five full volumes of distilled water at 20°C on 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 Dispenser.

4. For re-calibration pull the cap outwards to expose the Calibration nut. (Fig. 13-3)

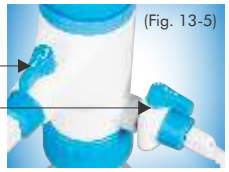

(Fig. 13-3)

5. Using the calibration tool, turn the calibration nut clockwise to reduce the volume and anticlockwise to increase the volume. Repeat this procedure till the desired volume is achieved on the electronic balance. (Fig. 13-4)


(Fig. 13-4)

NOTE - After the calibration is finished, also check the reading for the second inlet B. Set the dispenser to RINSE mode.

POSITION - Knob A - Open
Knob B - Open (Fig. 13-5)



(Fig. 13-5)

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

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

13. Maintenance / Cleaning

The Dispenser should be cleaned in the following situations :

- Immediatley when the piston is difficult to move.
- Before changing the reagent.
- Prior to long term storage.
- Prior to dismantling the instrument.
- Prior to autoclaving.
- Regularly when using liquids which form deposits (e.g. crystallizing liquids).
- Regularly when liquids accumulate in the cap.

⚠ All maintenance should be carried out wearing suitable eye protection and protective clothing. If in doubt, consult your safety officer.

1. Make sure that the Dispenser is completely empty.
2. Place the instrument into an empty sink together with its reservoir.
3. Unscrew the threaded platform base from the reservoir and lift the dispenser'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.
4. Hold the dispense nozzle over the aperture of the reservoir and apply gentle piston strokes in order to return any contents into the reservoir.
5. Empty the instrument completely and flush thoroughly with distilled water.
6. If the piston barrel is still not completely clean, you need to dis-assemble the dispenser. Refer Dis-assembling procedure given below.

15. Dis-assembling the dispenser for cleaning and servicing :

1. Procedure to dis-assemble the piston:

- Pull the cap outwards to expose the Calibration Nut. (Fig. 15-1)


(Fig. 15-1)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 15-2)


(Fig. 15-2)

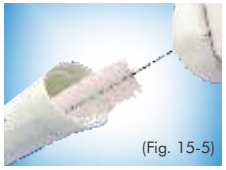
- After unscrewing pull out the shaft. (Fig. 15-3)


(Fig. 15-3)

- Rinse the piston and shaft with deionized water. (Fig. 15-4)


(Fig. 15-4)

- Clean the cylinder with a bottle-brush. If necessary carefully remove deposits at the edge of the glass cylinder. (Fig. 15-5)


(Fig. 15-5)

- Then flush all the parts of the instrument with deionized water. (Fig. 15-6)


(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. 15-7)

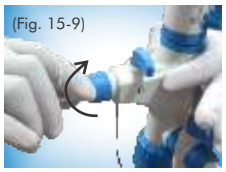

(Fig. 15-7)

- Snap back the cap to complete the assembly. (Fig. 15-8)


(Fig. 15-8)

2. (a) Procedure to dis-assemble the DELIVERY PIPE A

- Unscrew the chuck nut and pull out the delivery pipe. (Fig. 15-9) & (Fig. 15-10)

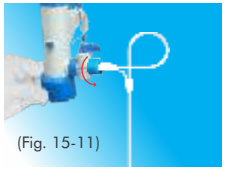

(Fig. 15-9)


(Fig. 15-10)

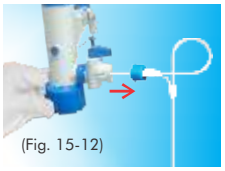
- Clean the pipe with deionized water.

2. (b) Procedure to dis-assemble the INLET PIPE B

- Unscrew the chuck nut and pull out the inlet pipe. (Fig. 15-11) & (Fig. 15-12)


(Fig. 15-11)

- Clean the pipe with deionized water.


(Fig. 15-12)

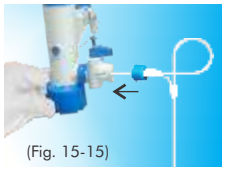
3. (a) Procedure to re-assemble the DELIVERY PIPE A

- First push the delivery pipe into the lower housing till it stops going in further. (Fig. 15-13)

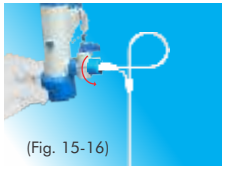
- Screw the chuck nut to complete the assembly. (Fig. 15-14)

3. (b) Procedure to re-assemble the INLET PIPE B

- Insert the extension tube attachment into the hole of the Inlet B. Push the tube to ensure the tight fitment. (Fig.15-15)


(Fig. 15-15)

- Screw the chuck nut on the extension tube to tightly secure the inlet pipe. (Fig. 15-16)


(Fig. 15-16)

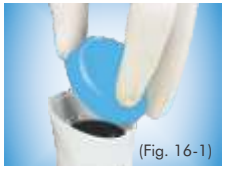
16. Autoclaving

This instrument is autoclavable at 121° C) (250° F) 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.

Dis-assembling for Autoclaving :

- Pull the cap outwards to expose the Calibration Nut. (Fig. 16-1)


(Fig. 16-1)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 16-2)


(Fig. 16-2)

- After unscrewing pull out the shaft. (Fig. 16-3)


(Fig. 16-3)

- This is the piston-shaft sub-assembly. (Fig. 16-4)


(Fig. 16-4)

- Autoclave the two sub-assemblies at 121°C and 15 psi pressure for 10-15 mins. (Fig. 16-5)


(Fig. 16-5)

Re-assembling after Autoclaving :

- Insert the piston completely into the cylinder and then reassemble the instrument use in the calibration tool by screwing back the piston. (Fig. 16-6)


(Fig. 16-6)

- Snap back the cap to complete the assembly. (Fig. 16-7)


(Fig. 16-7)

- Dispenser is now ready for use.
  Re-calibation is required after autoclaving.
  (Fig. 16-8)


(Fig. 16-8

17. Troubleshooting

Trouble	Possible Cause	Solution
Piston Difficult to move	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions. (see page 21)
Air bubbles appear in the Instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	The instrument has not been primed	Prime the instrument. (see page 15)
	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 filling tube.
	Liquid reservoir is empty	Refill reservoir and prime unit.
	Too fast filling action	Fill and dispense slowly.
	Leaking Piston	Clean Piston. (see page 21) If problem persist replace piston.
	Leaking discharge valve	Clean by flushing throughly with distilled water. (see page 21)
Dispensing not possible	Blocked Dispense nozzle	Disassemble the dispense nozzle and flush through with distilled water.
	Discharge valve stuck	Clean Unit by immersing valve assembly in distilled water. (see page 21)
Wrong Dispenser Volume	Instrument not calibrated	Follow steps of user calibration. (see page 14)
Barrel does not fill with liquid	Inlet tube not fitted firmly	Connect inlet tube correctly. (see page 12, Fig. 2)
Filling Not Possible	Volume adjustment to Minimum setting	Set to required volume. (see page 16)

SPECIFICATIONS & ORDERING INFORMATION

Model No.	Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± ml
ULT-2.5	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005
ULT-5	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
ULT-10	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
ULT-30	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
ULT-60	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
ULT-100	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200

Error limits (Accuracy & Coefficient of variation) according to the nominal capacity (= maximum volume) indicated on the instrument, obtained with instrument and distilled water at equilibrium with ambient temperature at 20 °C, and with smooth, steady operation. The error limits are well within the limits of DIN EN ISO 8655-2.

Beatus

Bottle Top Dispenser

(Re-Circulation Valve)

Operation Manual

Microlit

TABLE OF CONTENTS

Intended Use Of The Instrument

The Bottle Top Dispenser is a general purpose laboratory instrument intended for use in laboratories for dispensing reagents and chemicals which are compatible with the instrument. (see page 4)

Safety Instructions

This instrument may sometimes be used with hazardous materials, operations and equipments. 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 responsibility of the user of this instrument to consult and establish appropriate safety and health practice 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 built up 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. (see page 2) Observe operating exclusions.
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 closure is attached.
8). Never remove the discharge tube while the dispensing cylinder is filled.
9). Reagents can accumulate in the cap of the discharge tube. Thus, it should be cleaned regularly.
10). Never carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may also lead to personal injury from chemicals.
11). Never use force on the instrument. Use smooth gentle movements to operate the piston upwards and downwards. Use only original manufacturer's accessories and spare parts.
12). Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the operating manual.

13). Always check the instrument for visual damage before use.
14). If there is a sign of a potential malfunction (e.g. piston difficult to move, sticking valve or leakage). immediately stop dispensing. Consult the 'Troubleshooting' section of this manual and contact the manufacturer if needed. (see page 20)

Functions and Limitations of Use

The bottle top dispenser is designed for dispensing liquids directly from the reservoir bottle.
The instrument is calibrated according to the requirements 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.

Limitations of use :

- This instrument is designed for dispensing liquids, observing the following physical limits:
- Use temperature from +15°C to +40°C (from 59°F to 104°F) of instrument and reagent
- Vapor pressure up to max. 600 mbar. Aspirate slowly above 300 mbar, in order to prevent the liquid from boiling.
- Kinematic viscosity 500 mm^2
  (dynamic viscosity [mPas] = kinematic viscosity [mm^2 /s] x density [g/cm^3])
- Density: up to 2.2 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). If the piston becomes difficult to move, the instrument should be cleaned immediately. (see page 15)
When dispensing inflammable media, make sure to avoid buildup of static charge, e.g. do not dispense into plastic vessels, do not wipe instrument with a dry cloth.
The Dispenser is designed for general laboratory applications and complies with the relevant standards, e.g. DIN EN ISO 8655. Compatibility of the instrument for a specific application (e.g. trace material analysis, food sector etc.) must be checked by the user. Approvals for specific applications, e.g. for production and administration of food, pharmaceuticals and cosmetics are not available.

Operating Exclusions

Never use with:

Liquids attacking FEP, PFA and PTFE (e.g. dissolved sodium azide*)

Liquids attacking 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 solid particles may clog or damage the instrument

Liquids attacking PP (cap)**

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

** Liquids attacking PP (cap)

Storage Conditions

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

Chemical Resistance

Chemicals from A to Z

The following list includes most frequently used chemicals. It provides useful information for the safe and adequate use of *Beatus*. However, safety precautions and recommendations in operating instructions must be followed carefully.

Code explanations

A = Good resistance B = Acceptable with limitations C = Not recommended

1 = Possible crystallisation - blockage or possible coating peeling
(do not let dry plunger/barrel together).

2 = Swell of plunger protection layer, possible peeling.

3 = Acid vapours (better resistance with lower concentration).
Do not leave instrument on bottle.

4 = Risk of damage, softening or discoloration of external parts through vapours.
Do not leave instrument on bottle.

5 = 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/4
Acetic anhydride	B/4
Acetone (Propanone)	B/4
Acetonitrile (MECN)	B/4
Acetophenone	B/4
Acetyl Chloride	B/4
Acetylacetone	A
Acrylic acid	A
Acrylonitrile	B/4
Adipic acid	A
Allyl alcohol	A
Aluminum chloride	A
Amino acids	A
Ammonia 20%	B/4
Ammonia 20-30%	B/4
Ammonium chloride	A
Ammonium fluoride	A
Ammonium molybdate	A
Ammonium sulfate	A
Amyl alcohol (Pentanol)	A
Amyl chloride (Chloropentane)	B/4
Aniline	A
Ascorbic acid	A
n-Amyl acetate	B/4
B	
Barium chloride	A
Benzaldehyde	A
Benzene	B/4
Benzine	A
Benzoyl chloride	B/4
Benzyl alcohol	A
Benzyl chloride	B/4
Bis(2-ethylhexyl) phthalate	B/4
Boric acid 10%	A
Bromine	C/4
Bromobenzene	B/4
Bromonaphtalene	A
Butanediol	A
Butanol	A
Butanone (MEK)	B/4
Butyl acetate	B/4
Butyl methyl ether	B/4
Butylamine	B/4
Butyric acid	B/4

Chemicals A - Z	
C	
Calcium carbonate	A
Calcium chloride	A
Calcium hydroxide	A
Calcium hypochlorite	A
Carbon disulfide	B/4
Carbon tetrachloride	B/4
Chlorine dioxide	B/4
Chlorine water	B/4
Chloro naphthalene	B/4
Chloroacetaldehyde 45%	A
Chloroacetic acid	A
Chloroacetone	B/4
Chlorobenzene	B/4
Chlorobutane	B/4
Chloroethanol	B/4
Chloroform	B/4
Nitro-hydrochloric acid (Aqua regia)	B/4
Chlorosulfonic acid	B/4
Chlorosulfuric acid 100%	B/3/4
Chromic acid 100%	B/3/4
Chromosulfuric acid 100%	C/3/4
Citric acid	A
Copper fluoride	A
Copper sulfate	A
Cresol	A
Cumene (Isopropylbenzene)	B/4
Cyanoacrylate	A
Cyclohexane	B/4
Cyclohexanone	B/4
Cyclopentane	B/4
D	
1,2-Diethylbenzene	B/4
1,4-Dioxane (Diethylene dioxide)	B/4
1-Decanol	A
Decane	A
Di-(2-ethylhexyl) peroxydicarbonate	B/4
Dibenzyl ether	B/4
Dichloroacetic acid	A
Dichlorobenzene	A
Dichloroethane	A
Dichloroethylene	B/4
Diesel oil (Heating oil)	A
Diethanolamine	A
Diethylamine	B/4
Diethylene glycol	A
Diethylether	B/4
Dimethyl sulfoxide (DMSO)	B/4
Dimethylaniline	A
Dimethylformamide (DMF)	B/4

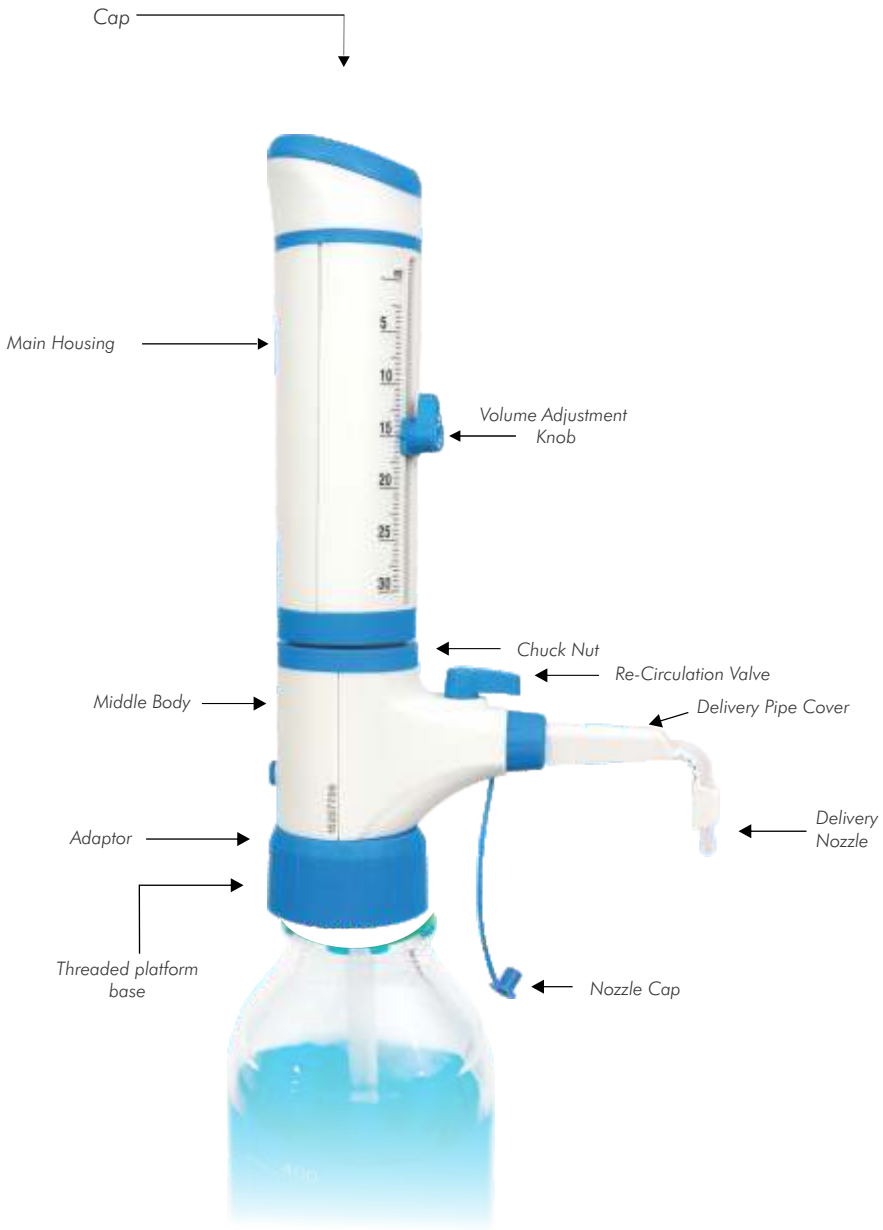
List of Reagents

Chemicals A - Z	
E	
Ethanol	A
Ethanolamine	B/4
Ether	B/4
Ethyl acetate	B/4
Ethylbenzene	B/4
Ethylene chloride	B/4
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/4
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/4
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/4
Hydrobromic acid	A
Hydrochloric acid 20% (HCl)	A
Hydrochloric acid 37% (HCl)	B/3
Hydrofluoric acid (HF)	C/5
Hydrogen peroxide	A
I	
Iodine	A
Iodine bromide	C/4
Iodine chloride	C/4
Isoamyl alcohol	A
Isobutanol	A
Isooctane	A
Isopropanol	A
Isopropyl ether	B/4
Iso-propylamine	B/4
L	
Lactic acid	A
M	
2-Methoxyethanol	A
Methanol	A
Methoxybenzene (Anisol)	B/4
Methyl benzoate	B/4
Methyl chloride (Chloromethane)	B/4
Methyl formate	A

Methyl iodide (Iodomethane)	B/4
Chemicals A - Z	

M	
Methyl methacrylate (MMA)	B/4
Methyl propyl ketone (2-Pentanone)	A
Methyl tert-butyl ether	B/4
Methylene chloride (Dichloromethane) (DCM)	B/4
Methylpentanone	A
Mineral oil (engine oil)	A
Monochloroacetic acid	A
N	
N-Butylamine	B/4
Nitric acid 100%	C/4
Nitric acid 30-70%	B/4
Nitric acid dil. <30%	B/4
Nitrobenzene	B/4
Nitromethane	B/4
N-methyl-2-pyrrolidone (NMP)	A
O	
Octane	A
Octanol	A
Oil (vegetable, animal)	B/4
Oil of turpentine	B/4
Oleic acid	A
Oxalic acid	A
P	
Pentane	B/4
Peracetic acid	A
Perchloric acid 100%	B/4
Perchloric acid diluted	A
Perchloroethylene	B/4
Petroleum	B/4
Petroleum ether / spirit	B/4
Phenol	A
Phenylethanol	B/4
Phenylhydrazine	B/4
Phosphoric acid 100%	A
Phosphoric acid 85%	A
Piperidine	B/4
Potassium chloride	A
Potassium dichromate	A
Potassium hydroxide	A
Potassium iodide	A
Potassium permanganate	A
Potassium peroxydisulfate (persulfate)	A
Potassium sulfate	A
Propionic acid (Propanoic acid)	A
Propylene glycol (Propane-1,2-diol)	A
Propylene oxide	A
Pyric acid (Trinitrophenol)	B/4
Pyridine	B/4

Chemicals A - Z	
P	
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/4
Sulfur dioxide	B/4
Sulfuric acid 100%	B/4
T	
1,1,2-Trichlortrifluoroethane	B/4
Tartaric acid	A
Tetrachlorethylene	B/4
Tetrahydrofuran (THF)	B/4
Tetramethylammonium hydroxide	A
Toluene	B/4
Trichlorethylene	B/4
Trichloroacetic acid	B/4
Trichlorobenzene	B/4
Trichloroethane	B/4
Trichloromethane (Chloroform)	B/4
Triethanolamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/4
Trifluoromethane (Fluoroform)	B/4
U	
Urea	A
X	
Xylene	B/4
Z	
Zinc chloride 10%	A
Zinc sulfate 10%	A



First Steps

Is everything in the package ? Confirm that package includes :

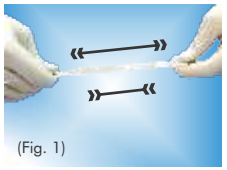
Bottle Top Dispenser, discharge tube, telescoping filling tube, calibration tool, different bottle adapters, a calibration certificate and this operation manual.

All dispensers will have the following adapters : 28, 32, 36, 40 & 45 mm.

Assembly

⚠ Wear protective clothing, eye protection and gloves. Follow all Safety instruction and observe limitations of use and operating limitations. (see page 2)

1. Adjust length of telescoping inlet tube.
   The length of FEP inlet tubing provided should be adjusted to fit your particular reservoir. Longer length of inlet tube are available on request. (Fig. 1)


(Fig. 1)

2. Fix the telescoping tube. (Fig. 2)


(Fig. 2)

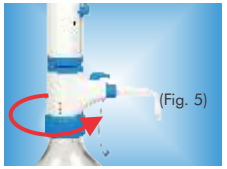
3. Choose the correct adapter for the bottle.
   The threaded platform base of dispenser has a 30 mm screw thread. Five adapters are supplied to suit containers with a 28, 32, 36, 40, 45 mm and 30 mm (inbuilt adapter) screw neck. (Fig. 3)


(Fig. 3)

4. Fix the adapter. (Fig. 4)


(Fig. 4)

5. Mount the dispenser :
   The assembled dispenser is screwed to the reservoir using gentle hand torque applied to the threaded platform base only. Removal should also be by means of hand torque applied to the same base. (Fig. 5)


(Fig. 5)

6. Ready to Use.

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

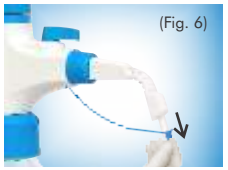
⚠ Always wear protective gloves when touching the instrument or the bottle, especially when using dangerous liquids. When mounted to a reagent bottle, always carry the instrument as shown in the figure (5).

⚠ Never press down the piston when the cap is on. Avoid splashing the reagent. The reagent can drip out from the discharge tube and cap. (Fig. 6)

Priming

Open the cap of the dispensing tube (Fig. 6). For safety hold the discharge tube orifice on the inner wall of a suitable receiving vessel.

1. Set valve to 'Recirculate' (Fig. 7)
   For priming gently pull up the piston approx, 30mm and push it down rapidly until the lower stop.
   Repeat this procedure 5 times (Fig. 8).

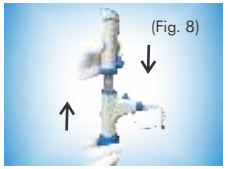

(Fig. 6)

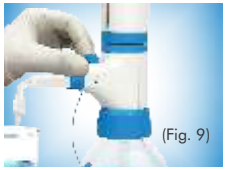
2. Turn valve to 'Dispense' (Fig.9).
   To avoid splashes when priming hold the discharge tube on the inner wall of a suitable receiving vessel and dispense liquid to prime the discharge tube until it is bubble free,
   Wipe away any remaining drops from the discharge tube.


(Fig. 7)

Note :

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


(Fig. 8)


(Fig. 9)

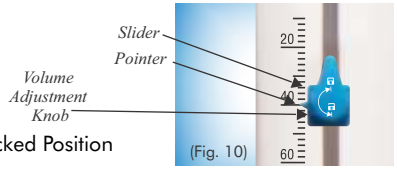
Dispensing

1. Volume Setting :

Volume Adjustment Knob :

It is simple and easy to operate. There are two positions of the knob as shown in Fig. 10-A

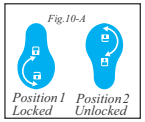
Position 1 : Locked Position | Position 2 : Unlocked Position



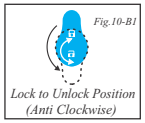
(Fig. 10)

Setting the Volume :

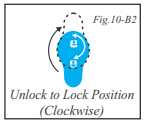
Follow these simple steps :



- Turn the Knob from Position 1 to Position 2 by rotating it ANTICLOCKWISE as shown in Fig. 10-B1.



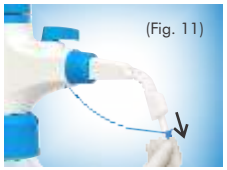
- The slider is now loose and can be moved up and down.
- Set your desired volume by aligning the pointer with the scale.
- To lock the set volume, turn the Knob from Position 2 to Position 1 by rotating it CLOCKWISE as shown in Fig. 10-B2 .



2. Dispensing :

⚠ Wear protective clothing, eye protection and gloves. Liquid may accumulate in the cap. To avoid splashes dispense slowly. Follow all safety instructions and observe limitations of use and operating limitations.

- Remove cap from the discharge tube. (Fig. 11)


(Fig. 11)

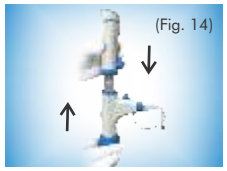
- When using the instrument (with recirculation valve) turn the valve to Dispensing. (Fig. 12)


(Fig. 12)

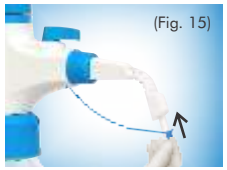
- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel. (Fig. 13)


(Fig. 13)

- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 14)


(Fig. 14)

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


(Fig. 15)

- Reattach cap to discharge tube. (Fig. 15)

Error Limits

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

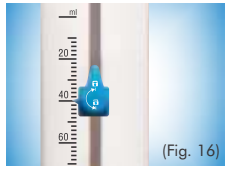
Error Limits			Specifications ISO 8655			
Model No.	Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± ml
BEAT-2.5	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005
BEAT-5	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010
BEAT-10	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020
BEAT-30	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060
BEAT-60	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120
BEAT-100	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200

User Calibration Procedure

Dispenser has been laboratory calibrated at its nominal volume. However, due to changes in environmental conditions and the viscosity of the media which you dispense, we recommend gravimetric testing every 3-12 months. Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 13) is performed as follows:

Re-Calibrate :

1. Set the Dispenser to the nominal volume or any other volume which is most commonly used by you. (Fig. 16) Follow the common rules for calibration used in statistical quality control (ISO 8655/2). Set the volume and dispense five full volumes of distilled water at 20°C on 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 Dispenser.


(Fig. 16)

2. For re-calibration pull the cap outwards to expose the Calibration nut. (Fig. 17)


(Fig. 17)

3. Using the calibration tool, turn the calibration nut clockwise to reduce the volume and anticlockwise to increase the volume. Repeat this procedure till the desired volume is achieved on the electronic balance. (Fig. 18)


(Fig. 18)

Maintenance / Cleaning

The Dispenser should be cleaned in the following situations :

- Immediatley 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.

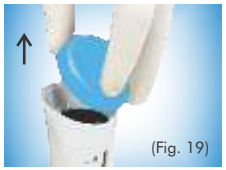
⚠ All maintenance should be carried out wearing suitable eye protection and protective clothing. If in doubt, consult your safety officer.

1. Make sure that the Dispenser is completely empty.
2. Place the instrument into an empty sink together with its reservoir.
3. Unscrew the threaded platform base from the reservoir and lift the dispenser'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.
4. Hold the dispense nozzle over the aperture of the reservoir and apply gentle piston strokes in order to return any contents into the reservoir.
5. Empty the instrument completely and flush thoroughly with distilled water.
6. If the piston barrel is still not completely clean, you need to dis-assemble the dispenser. Refer Dis-assembling procedure given below.

Dis-assembling the dispenser for cleaning and servicing :

1. Procedure to dis-assemble the piston:

- Pull the cap outwards to expose the Calibration Nut. (Fig. 19)


(Fig. 19)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 20)


(Fig. 20)

- After unscrewing pull out the shaft. (Fig. 21)


(Fig. 21)

- Rinse the piston and shaft with deionized water. (Fig. 22)


(Fig. 22)

- Clean the cylinder with a bottle-brush. If necessary carefully remove deposits at the edge of the glass cylinder. (Fig. 23)


(Fig. 23)

- Then flush all the parts of the instrument with deionized water. (Fig. 24)


(Fig. 24)

- Insert the piston completely into the cylinder and then reassemble the instrument using the calibration tool by screwing back the piston. (Fig. 25)

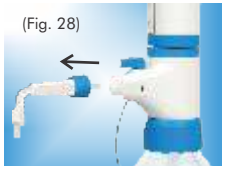

(Fig. 25)

- Snap back the cap to complete the assembly. (Fig. 26)

2. Procedure to dis-assemble the DELIVERY PIPE

- Unscrew the chuck nut and pull out the delivery pipe. (Fig. 27) & (Fig. 28)

- Clean the delivery pipe with deionized water.



3. Procedure to re-assemble the DELIVERY PIPE

- First push the delivery pipe into the lower housing till it stops going in further. (Fig. 29)

- Screw the chuck nut to complete the assembly. (Fig. 30)

Autoclaving

This instrument is autoclavable at 121° C) (250° F) 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.

Dis-assembling for Autoclaving :

- Pull the cap outwards to expose the Calibration Nut. (Fig. 31)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 32)

- After unscrewing pull out the shaft. (Fig. 33)

- This is the piston-shaft sub-assembly. (Fig. 34)

- Autoclave the two sub-assemblies at 121°C and 15 psi pressure for 10-15 mins. (Fig. 35)


(Fig. 35)

Re-assembling after Autoclaving :

- Insert the piston completely into the cylinder and then reassemble the instrument use in the calibration tool by screwing back the piston. (Fig. 36)


(Fig. 36)

- Snap back the cap to complete the assembly. (Fig. 37)


(Fig. 37)

- Dispenser is now ready for use.
  No Re-calibation is required after autoclaving.
  However, a quick calibration check is recommended.
  (Fig. 38)


(Fig. 38)

Troubleshooting

Trouble	Possible Cause	Solution
Piston Difficult to move	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions. (see page 15)
Air bubbles appear in the Instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	The instrument has not been primed	Prime the instrument. (see page 11)
	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 filling tube.
	Liquid reservoir is empty	Refill reservoir and prime unit.
	Too fast filling action	Fill and dispense slowly.
	Leaking Piston	Clean Piston. (see page 15) If problem persist replace piston.
	Leaking discharge valve	Clean by flushing throughly with distilled water. (see page 15)
Dispensing not possible	Blocked Dispense nozzle	Disassemble the dispense nozzle and flush through with distilled water.
	Discharge valve stuck	Clean Unit by immersing valve assembly in distilled water. (see page 15)
Wrong Dispenser Volume	Instrument not calibrated	Follow steps of user calibration. (see page 14)
Barrel does not fill with liquid	Inlet tube not fitted firmly	Connect inlet tube correctly. (see page 10, Fig. 2)
Filling Not Possible	Volume adjustment to Minimum setting	Set to required volume. (see page 12)

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Intended Use Of The Instrument

The Bottle Top Dispenser is a general purpose laboratory instrument intended for use in laboratories for dispensing reagents and chemicals which are compatible with the instrument. (see page 4)

Safety Instructions

This instrument may sometimes be used with hazardous materials, operations and equipments. 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 responsibility of the user of this instrument to consult and establish appropriate safety and health practice 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 built up 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. (see page 2) Observe operating exclusions.
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 closure is attached.
8). Never remove the discharge tube while the dispensing cylinder is filled.
9). Reagents can accumulate in the cap of the discharge tube. Thus, it should be cleaned regularly.
10). Never carry the mounted instrument by the cylinder sleeve or the valve block. Breakage or loosening of the cylinder may also lead to personal injury from chemicals.
11). Never use force on the instrument. Use smooth gentle movements to operate the piston upwards and downwards. Use only original manufacturer's accessories and spare parts.
12). Do not attempt to make any technical alterations. Do not dismantle the instrument any further than is described in the operating manual.

13). Always check the instrument for visual damage before use.
14). If there is a sign of a potential malfunction (e.g. piston difficult to move, sticking valve or leakage). immediately stop dispensing. Consult the 'Troubleshooting' section of this manual and contact the manufacturer if needed. (see page 19)

Functions and Limitations of Use

The bottle top dispenser is designed for dispensing liquids directly from the reservoir bottle.
The instrument is calibrated according to the requirements 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.

Limitations of use :

- This instrument is designed for dispensing liquids, observing the following physical limits:
- Use temperature from +15°C to +40°C (from 59°F to 104°F) of instrument and reagent
- Vapor pressure up to max. 600 mbar. Aspirate slowly above 300 mbar, in order to prevent the liquid from boiling.
- Kinematic viscosity 500 mm^2
  (dynamic viscosity [mPas] = kinematic viscosity [mm^2 /s] x density [g/cm^3])
- Density: up to 2.2 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). If the piston becomes difficult to move, the instrument should be cleaned immediately. (see page 14)
When dispensing inflammable media, make sure to avoid buildup of static charge, e.g. do not dispense into plastic vessels, do not wipe instrument with a dry cloth.
The Dispenser is designed for general laboratory applications and complies with the relevant standards, e.g. DIN EN ISO 8655. Compatibility of the instrument for a specific application (e.g. trace material analysis, food sector etc.) must be checked by the user. Approvals for specific applications, e.g. for production and administration of food, pharmaceuticals and cosmetics are not available.

Operating Exclusions

Never use with:

Liquids attacking FEP, PFA and PTFE (e.g. dissolved sodium azide*)

Liquids attacking 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 solid particles may clog or damage the instrument

Liquids attacking PP (cap)**

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

** Liquids attacking PP (cap)

Storage Conditions

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

Chemical Resistance

Chemicals from A to Z

The following list includes most frequently used chemicals. It provides useful information for the safe and adequate use of the Dispenser. However, safety precautions and recommendations in operating instructions must be followed carefully.

Code explanations

A = Good resistance B = Acceptable with limitations C = Not recommended

1 = Possible crystallisation - blockage or possible coating peeling
(do not let dry plunger/barrel together).

2 = Swell of plunger protection layer, possible peeling.

3 = Acid vapours (better resistance with lower concentration).
Do not leave instrument on bottle.

4 = Risk of damage, softening or discoloration of external parts through vapours.
Do not leave instrument on bottle.

5 = 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/4
Acetic anhydride	B/4
Acetone (Propanone)	B/4
Acetonitrile (MECN)	B/4
Acetophenone	B/4
Acetyl Chloride	B/4
Acetylacetone	A
Acrylic acid	A
Acrylonitrile	B/4
Adipic acid	A
Allyl alcohol	A
Aluminum chloride	A
Amino acids	A
Ammonia 20%	B/4
Ammonia 20-30%	B/4
Ammonium chloride	A
Ammonium fluoride	A
Ammonium molybdate	A
Ammonium sulfate	A
Amyl alcohol (Pentanol)	A
Amyl chloride (Chloropentane)	B/4
Aniline	A
Ascorbic acid	A
n-Amyl acetate	B/4
B	
Barium chloride	A
Benzaldehyde	A
Benzene	B/4
Benzine	A
Benzoyl chloride	B/4
Benzyl alcohol	A
Benzyl chloride	B/4
Bis(2-ethylhexyl) phthalate	B/4
Boric acid 10%	A
Bromine	C/4
Bromobenzene	B/4
Bromonaphtalene	A
Butanediol	A
Butanol	A
Butanone (MEK)	B/4
Butyl acetate	B/4
Butyl methyl ether	B/4
Butylamine	B/4
Butyric acid	B/4

Chemicals A - Z	
C	
Calcium carbonate	A
Calcium chloride	A
Calcium hydroxide	A
Calcium hypochlorite	A
Carbon disulfide	B/4
Carbon tetrachloride	B/4
Chlorine dioxide	B/4
Chlorine water	B/4
Chloro naphthalene	B/4
Chloroacetaldehyde 45%	A
Chloroacetic acid	A
Chloroacetone	B/4
Chlorobenzene	B/4
Chlorobutane	B/4
Chloroethanol	B/4
Chloroform	B/4
Nitro-hydrochloric acid (Aqua regia)	B/4
Chlorosulfonic acid	B/4
Chlorosulfuric acid 100%	B/3/4
Chromic acid 100%	B/3/4
Chromosulfuric acid 100%	C/3/4
Citric acid	A
Copper fluoride	A
Copper sulfate	A
Cresol	A
Cumene (Isopropylbenzene)	B/4
Cyanoacrylate	A
Cyclohexane	B/4
Cyclohexanone	B/4
Cyclopentane	B/4
D	
1,2-Diethylbenzene	B/4
1,4-Dioxane (Diethylene dioxide)	B/4
1-Decanol	A
Decane	A
Di-(2-ethylhexyl) peroxydicarbonate	B/4
Dibenzyl ether	B/4
Dichloroacetic acid	A
Dichlorobenzene	A
Dichloroethane	A
Dichloroethylene	B/4
Diesel oil (Heating oil)	A
Diethanolamine	A
Diethylamine	B/4
Diethylene glycol	A
Diethylether	B/4
Dimethyl sulfoxide (DMSO)	B/4
Dimethylaniline	A
Dimethylformamide (DMF)	B/4

List of Reagents

Chemicals A - Z	
E	
Ethanol	A
Ethanolamine	B/4
Ether	B/4
Ethyl acetate	B/4
Ethylbenzene	B/4
Ethylene chloride	B/4
Ethylene diamine	A
Ethylene glycol	A
F	
Fluoroacetic acid	B/1/4
Formaldehyde (Formalin)	A
Formamide	A
Formic acid	A
G	
Gamma-butyrolactone	A
Gasoline	B/4
Glycerin <40%	A
Glycolic acid 50%	B/1
H	
Heating oil (Diesel oil)	A
Heptane	A
Hexane	A
Hexanoic acid	B/1
Hexanol	A
Hydriodic acid	B/4
Hydrobromic acid	A
Hydrochloric acid 20% (HCl)	A
Hydrochloric acid 37% (HCl)	B/3
Hydrofluoric acid (HF)	C/5
Hydrogen peroxide	A
I	
Iodine	A
Iodine bromide	C/4
Iodine chloride	C/4
Isoamyl alcohol	A
Isobutanol	A
Isooctane	A
Isopropanol	A
Isopropyl ether	B/4
Iso-propylamine	B/4
L	
Lactic acid	A
M	
2-Methoxyethanol	A
Methanol	A
Methoxybenzene (Anisol)	B/4
Methyl benzoate	B/4
Methyl chloride (Chloromethane)	B/4
Methyl formate	A

Methyl iodide (Iodomethane)	B/4
Chemicals A - Z	

M	
Methyl methacrylate (MMA)	B/4
Methyl propyl ketone (2-Pentanone)	A
Methyl tert-butyl ether	B/4
Methylene chloride (Dichloromethane) (DCM)	B/4
Methylpentanone	A
Mineral oil (engine oil)	A
Monochloroacetic acid	B/1
N	
N-Butylamine	B/4
Nitric acid 100%	C/4
Nitric acid 30-70%	B/4
Nitric acid dil. <30%	B/4
Nitrobenzene	B/4
Nitromethane	B/4
N-methyl-2-pyrrolidone (NMP)	A
O	
Octane	A
Octanol	A
Oil (vegetable, animal)	B/4
Oil of turpentine	B/4
Oleic acid	A
Oxalic acid	A
P	
Pentane	B/4
Peracetic acid	A
Perchloric acid 100%	B/4
Perchloric acid diluted	A
Perchloroethylene	B/4
Petroleum	B/4
Petroleum ether / spirit	B/4
Phenol	A
Phenylethanol	B/4
Phenylhydrazine	B/4
Phosphoric acid 100%	A
Phosphoric acid 85%	A
Piperidine	B/4
Potassium chloride	A
Potassium dichromate	A
Potassium hydroxide	A
Potassium iodide	A
Potassium permanganate	A
Potassium peroxydisulfate (persulfate)	A
Potassium sulfate	A
Propionic acid (Propanoic acid)	A
Propylene glycol (Propane-1,2-diol)	A
Propylene oxide	A
Pyric acid (Trinitrophenol)	B/4
Pyridine	B/4

Chemicals A - Z	
P	
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/4
Sulfur dioxide	B/4
Sulfuric acid 100%	B/4
T	
1,1,2-Trichlortrifluoroethane	B/4
Tartaric acid	A
Tetrachlorethylene	B/4
Tetrahydrofuran (THF)	B/4
Tetramethylammonium hydroxide	A
Toluene	B/4
Trichlorethylene	B/4
Trichloroacetic acid	B/4
Trichlorobenzene	B/4
Trichloroethane	B/4
Trichloromethane (Chloroform)	B/4
Triethanolamine	A
Triethylene glycol	A
Trifluoroacetic anhydride (TFAA)	B/4
Trifluoromethane (Fluoroform)	B/4
U	
Urea	A
X	
Xylene	B/4
Z	
Zinc chloride 10%	A
Zinc sulfate 10%	A

⚠ Always wear protective gloves when touching the instrument or the bottle, especially when using dangerous liquids. When mounted to a reagent bottle, always carry the instrument as shown in the figure (5).

⚠ Never press down the piston when the cap is on. Avoid splashing the reagent. The reagent can drip out from the discharge tube and cap. (Fig. 9)

Priming

- Place a receiving vessel under the Dispenser's delivery nozzle. (Fig.7)
- Remove the Nozzle Cap. (Fig.9)
- Prime the unit with a few gentle up and down strokes, taking the piston right down to it's lowest stop position and lifting it up. (Fig.8)
- Repeat until a steady bubble free flow is visible in the barrel.

Dispensing

Volume Adjustment Knob (Fig. 6)

It is simple and easy to operate. There are two positions of the knob as shown in Fig. 6 A :

- Position 1 : Locked Position
- Position 2 : Unlocked Position

Setting the Volume : Follow these simple steps :

- Turn the Knob from Position 1 to Position 2 by rotating it ANTICLOCKWISE as shown in Fig. 6 B1.
- The slider is now loose and can be moved up and down.
- Set your desired volume by aligning the pointer with the scale.
- To lock the set volume, turn the Knob from Position 2 to Position 1 by rotating it CLOCKWISE as shown in Fig. 6 B2 .

Fig. 6

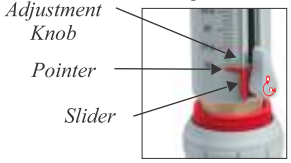


Fig. 6 A

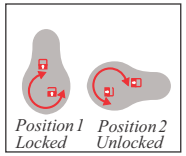


Fig. 6 B1

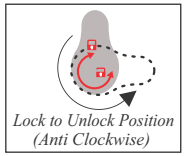
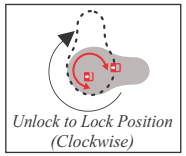


Fig. 6 B2



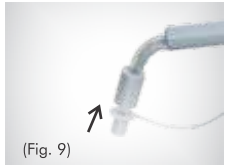
- Hold the discharge tube orifice on the inner wall of a suitable receiving vessel. (Fig. 7)


(Fig. 7)

- Gently lift the piston until the upper stop and then depress piston slowly and steadily with minimal force until the lower stop. (Fig. 8)


(Fig. 8)

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


(Fig. 9)

- Reattach cap to discharge tube. (Fig. 9)

Error Limits

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

Error Limits		Specifications (ISO 8655)			
Vol. Range	Increment	Accuracy ±%	Accuracy ± ml	CV ±%	CV ± 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

User Calibration Procedure

Dispenser has been laboratory calibrated at its nominal volume. However, due to changes in environmental conditions and the viscosity of the media which you dispense, we recommend gravimetric testing every 3-12 months. Gravimetric volume testing according to DIN EN ISO 8655-6 (for measurement conditions, see 'Error Limits', page 13) is performed as follows:

Re-Calibrate :

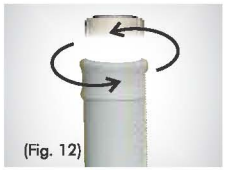
1. Set the Dispenser to the nominal volume or any other volume which is most commonly used by you. (Fig. 10) Follow the common rules for calibration used in statistical quality control (ISO 8655/2). Set the volume and dispense five full volumes of distilled water at 20°C on Electronic Balance to establish the actual mean volume of liquid dispensed. If the gravitational average result varies from the volume displayed, you should re-calibrate the Dispenser.


(Fig. 10)

2. For re-calibration pull the cap outwards to expose the Calibration nut. (Fig. 11)


(Fig. 11)

3. Using the calibration tool, turn the calibration nut clockwise to reduce the volume and anticlockwise to increase the volume. Repeat this procedure till the desired volume is achieved on the electronic balance. (Fig. 12)


(Fig. 12)

Maintenance / Cleaning

The Dispenser should be cleaned in the following situations :

- Immediatley 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 should be carried out wearing suitable eye protection and protective clothing. If in doubt, consult your safety officer.

1. Make sure that the Dispenser is completely empty.
2. Place the instrument into an empty sink together with its reservoir.
3. Unscrew the threaded platform base from the reservoir and lift the dispenser'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.
4. Hold the dispense nozzle over the aperture of the reservoir and apply gentle piston strokes in order to return any contents into the reservoir.
5. Empty the instrument completely and flush thoroughly with distilled water.
6. If the piston barrel is still not completely clean, you need to dis-assemble the dispenser. Refer Dis-assembling procedure given below.

Dis-assembling the dispenser for cleaning and servicing :

1. Procedure to dis-assemble the piston:

- Pull the cap outwards to expose the Calibration Nut. (Fig. 13)


(Fig. 13)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 14)


(Fig. 14)

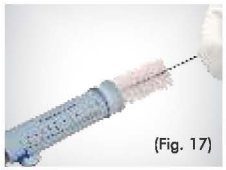
- After unscrewing pull out the shaft. (Fig. 15)


(Fig. 15)

- Rinse the piston and shaft with deionized water. (Fig. 16)


(Fig. 16)

- Clean the cylinder with a bottle-brush. If necessary carefully remove deposits at the edge of the glass cylinder. (Fig. 17)


(Fig. 17)

- Then flush all the parts of the instrument with deionized water. (Fig. 18)


(Fig. 18)

- Insert the piston completely into the cylinder and then reassemble the instrument using the calibration tool by screwing back the piston. (Fig. 19)


(Fig. 19)

Snap back the cap to complete the assembly.

2. Procedure to dis-assemble the BARREL

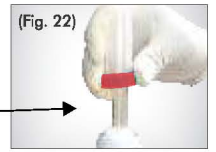
- Remove the Barrel Cap.(Fig.13)
- Unscrew the Calibration using the special tool provided with the instrument. (Fig.14)
- After unscrewing pull out the shaft. (Fig. 15)
- Lift the upper housing to expose the Barrel and cover. (Fig20)


(Fig. 20)


(Fig. 21)

- Unscrew Chuck Nut 1 and remove Barrel cover. (Fig. 21)
- Glass Barrel in now exposed.
- Gently pull the barrel upwards to detach it from the Valve Manifold. (Fig.22)

Glass Barrel

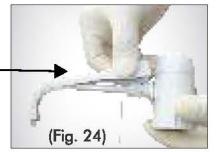

(Fig. 22)

- Barrel has been dis-assembled for cleaning. (Fig.23)


(Fig. 23)

3. Procedure to dis-assemble the DELIVERY PIPE and VALVE MANIFOLD.

Delivery Pipe Cover

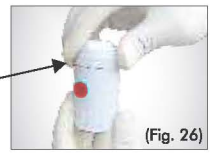

(Fig. 24)

- Remove the delivery pipe cover by pulling it upwards from the slot. (Fig.24)

Delivery Pipe


(Fig. 25)

- Unscrew and remove the delivery pipe. (Fig.25)


(Fig. 26)

- Unscrew the chuck Nut. (Fig.26)

Chuck Nut 2

- Remove Chuck Nut 2 and pull out the valve manifold. (Fig.27)

Valve Manifold.


(Fig. 27)

Autoclaving

This instrument is autoclavable at 121° C) (250° F) 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.

Dis-assembling for Autoclaving :

- Pull the cap outwards to expose the Calibration Nut. (Fig. 28)


(Fig. 28)

- Unscrew the Calibration Nut with the help of calibration tool to dis-assemble the Piston and shaft out of the main housing. (Fig. 29)


(Fig. 29)

- After unscrewing pull out the shaft. (Fig. 30)


(Fig. 30)

- This is the piston-shaft sub-assembly. (Fig. 31)


(Fig. 31)

- Autoclave the two sub-assemblies at 121°C and 15 psi pressure for 10-15 mins. (Fig. 32)


(Fig. 32)

Re-assembling after Autoclaving :

- Insert the piston completely into the cylinder and then reassemble the instrument use in the calibration tool by screwing back the piston. (Fig. 33)


(Fig. 33)

- Snap back the cap to complete the assembly. (Fig. 34)


(Fig. 34)

Dispenser is now ready for use.
No Re-calibation is required after autoclaving.
However, a quick calibration check is recommended.
(Fig. 35)


(Fig. 35)

Troubleshooting

Trouble	Possible Cause	Solution
Piston Difficult to move	Formation of crystals, dirty	Stop dispensing immediately. Loosen piston with circular motion, but do not disassemble. Follow all cleaning instructions. (see page 14)
Air bubbles appear in the Instrument	Reagent with high vapor pressure has been drawn in too quickly	Slowly draw in reagent.
	The instrument has not been primed	Prime the instrument. (see page 11)
	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 filling tube.
	Liquid reservoir is empty	Refill reservoir and prime unit.
	Too fast filling action	Fill and dispense slowly.
	Leaking Piston	Clean Piston. (see page 14) If problem persist replace piston.
	Leaking discharge valve	Clean by flushing throughly with distilled water. (see page 14)
Dispensing not possible	Blocked Dispense nozzle	Disassemble the dispense nozzle and flush through with distilled water.
	Discharge valve stuck	Clean Unit by immersing valve assembly in distilled water. (see page 14)
Wrong Dispenser Volume	Instrument not calibrated	Follow steps of user calibration. (see page 13)
Barrel does not fill with liquid	Inlet tube not fitted firmly	Connect inlet tube correctly. (see page 10, Fig. 2)
Filling Not Possible	Volume adjustment to Minimum setting	Set to required volume. (see page 11)

0.2 µl - 1000 µl

0.5 ml - 1000 ml

1 ml - 10 ml

Product Description:

The pipettes are continuously adjustable, general purpose micropipettes for sampling and dispensing accurate liquid volume.

It operates on air displacement principal (i.e. an air interface is present between the piston and liquid) and uses a detachable, disposable tip. Desired volume is determined by the following formula.

$V = pr^2 h$

where
v = desired volume
r = radius
h = vertical distance traveled by the plunger.
Nine Models cover a range from 0.2 µl to 10µl.

Digital Display:

The adjustable volume micropipettes are filled with easy to read digital display.

Raw Material:

The pipette are made of mechanically durable and autoclavable materials

Pipette Operation:

Setting the delivery volume
1. Set the delivery volume using the pushbutton on the top of the pipette.

To increase the delivery volume, turn the push button counter clockwise
To decrease the delivery volume, turn it clockwise,
2. Make sure that the desired delivery click in to place.
3. Do not set volume outside the pipette's specified volume range.

Using excessive force to turn the push button out side the range may jam the mechanism and eventually damage the pipette.

Tip Ejection:

Each pipette is fitted with a tip ejector.
This helps to eliminate the risk of contamination.
To eject the tip, point the pipette at suitable waste receptacle and press the ejector button with your thumb.

Pipetting Techniques:

Push and release the push button slowly at all time particullary when working with high viscosity liquids. Never allow the push button to snap back, make sure that the tip is firmly attached to the tip cone. Check for foreign particles in the tip. Before you begin your actual pipetting work, fill and empty the tip 2-3 times with the solution that you will be pipetting. Hold the pipette in an upright position while aspirating liquid. The grippy should rest on your index finger. Make sure that the tips, pipette and solution are at the same temperature.

Forward Technique:

Fill a clean reagent reservoir with the liquid to be dispensed.
1. Depress the push button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button .
Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second stop. this action will empty the tip.
4. Release the push button to the ready position. If necessary change the tip and continue pipetting.

Reverse Technique:

The reverse technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volume. Fill a clean reagent reservoir with the liquid to be dispensed.
1. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. Withdraw the tip form the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second, continue to depress the push button all the way to the second stop. This action will empty the tip.
4. The remaining liquid should either be discarded with the tip or pipetted back in to the container to be dispensed.
1. Depress the push button all the way to the second stop.

Repetitive Technique

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume.

Fill a clean regent reservoir with the liquid to be dispensed.
1. Depress the push button all the

way to the second stop.

2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching against the edge of the reservoir to remove excess liquid.

3. Deliver the preset volume by gently depressing the push button to the first stop.
Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. Continue pipetting by repeating step 3 and 4.

Pipetting of hetrogeneous samples

(deproteinization in blood glucose determination, for example)

Use steps 1 and 2 of the forward technique to fill the tip with blood. Wipe the tip carefully with a dry clean tissue.

1. Immerse the tip into the reagent and depress the push button to the first stop. making sure the tip is well below the surface.
2. Release the push button slowly to the ready position. This will fill the tip. Keep the tip in the solution. First stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the push button all the way to completely empty the tip.

Calibration and adjustment

All the pipettes are factory calibrated

and adjusted to give the volume as specified with distilled or deionized water using the forward pipetting technique.

It should be noted that the use of other pipetting techniques may affect the calibration results. The pipettes are constructed to permit re-adjustment for other pipetting techniques or liquids of different temperature and viscosity.

Device requirements and test conditions

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of pipette.

Volume Range Readable

Graduation under 10 µl	0.001 mg
100 µl	0.01 mg
above100 µl	0.1 mg

Test liquid Water, distilled or deionized "grade 3" water conforming ISO 3696. Tests are done in a draft-free room at a constant (±0.5°C) temperature of water pipette and air between 15°C to 30°C. The relative humidity must be above 50% . Especially with volumes under 50 µl, the air humidity should be as high as possible to reduce the effect of evaporation trap are recommended.

Procedure

1. Do 10 Pipetting with the minimum volume.
2. Do 10 Pipetting with the maximum volume.
3. Calculate the inaccuracy (A) and imprecision (cv) of both series.
4. Compare the result to the limits in

the Table 1.

If the calculated results within the selected limits. The adjustments of pipette is correct adjustment

Range	Volume	Inaccuracy		Imprecision	
	µl	±%	µl	cv±%	µl
0.2 µl - 2 µl	2	2	.04	1.2	0.024
0.5 µl - 10 µl	10	1	0.1	0.5	0.05
2 µl - 20 µl	20	0.8	0.16	0.4	0.08
5 µl- 50 µl	50	0.8	0.4	0.4	0.2
10 µl - 100 µl	100	0.6	0.6	0.2	0.2
20 µl- 200 µl	200	0.6	1.2	0.2	0.4
100 µl- 1 ml	1000	0.6	6	0.2	2
0.5 ml - 5 mll	5000	0.6	30	0.2	10
1 ml -10 ml	10000	0.6	60	0.2	20

Fixed Volume	Inaccuracy		Imprecision	
µl	±%	µl	cv±%	µl
5	2	0.1	1	0.05
10	1	0.1	0.5	0.05
20	0.8	0.16	0.4	0.08
25	0.8	0.2	0.4	0.1
50	0.8	0.4	0.4	0.2
100	0.6	0.6	0.2	0.2
200	0.6	1.2	0.2	0.4
500	0.6	3	0.2	1
1000	0.6	6	0.2	2
2000	0.6	12	0.2	4
5000	0.6	30	0.2	10
10000	0.4	40	0.2	20

Adjustment

Adjustment is done with the service tool.
1. Place the service tool into the openings of the calibration nut at the top of the handle.
2. Turn the service tool clockwise to increase, or counter clockwise to decrease the volume.
3. After adjustment check the calibration according to the Instructions above.

Formula for calculating results
conversion of mass to volume
V= (w+e) x Z
v = volume (µl)
w= weight (mg)
e= evaporation loss (mg)
z=conversion factor for µl/mg conversion
Evaporation loss can be significant with low volume. To determine mass loss. Dispense water to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds.
(i.e. 6mg=0.2 mg/s)
Compare this to the pipetting time from taring to reading, typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2 mg/s) in this example . If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary. The factor Z is for converting the weight of the water to value is 1.0032 µl/mg at 22°C and 95 kPa. See conversion table below.

Temperature °C	Air pressure kPa						
	80	85	90	95	100	101.3	105
15.0	1.0017	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020
15.5	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020	1.0021
16.0	1.0019	1.0020	1.0020	1.0021	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0021	1.0022	1.0022	1.0022
17.0	1.0021	1.0022	1.0022	1.0022	1.0023	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024	1.0024
18.0	1.0022	1.0023	1.0023	1.0024	1.0025	1.0025	1.0025
18.5	1.0023	1.0024	1.0024	1.0025	1.0025	1.0026	1.0026
19.0	1.0024	1.0025	1.0025	1.0026	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0027	1.0028	1.0028
20.0	1.0026	1.0027	1.0027	1.0028	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0029	1.0030	1.0030
21.0	1.0028	1.0029	1.0029	1.0030	1.0031	1.0031	1.0031
21.5	1.0030	1.0031	1.0031	1.0031	1.0032	1.0032	1.0032
22.0	1.0031	1.0032	1.0032	1.0032	1.0033	1.0033	1.0033
22.5	1.0032	1.0033	1.0033	1.0033	1.0034	1.0034	1.0034
23.0	1.0033	1.0034	1.0034	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0036	1.0037
24.0	1.0035	1.0036	1.0036	1.0037	1.0037	1.0038	1.0038
24.5	1.0037	1.0038	1.0038	1.0038	1.0039	1.0039	1.0039
25.0	1.0038	1.0039	1.0039	1.0039	1.0040	1.0040	1.0040
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0041	1.0042
26.0	1.0040	1.0041	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0043	1.0043	1.0043	1.0044	1.0044	1.0044
27.0	1.0043	4.0044	4.0044	4.0045	4.0045	4.0045	4.0046
27.5	4.0045	1.0046	1.0046	1.0046	1.0047	1.0047	1.0047
28.0	1.0046	1.0047	1.0047	1.0047	1.0048	1.0048	1.0048
28.5	1.0048	1.0048	1.0048	1.0049	1.0049	1.0050	1.0050
29.0	1.0049	1.0050	1.0050	1.0050	1.0051	1.0051	1.0051
29.5	1.0051	1.0051	1.0051	1.0052	1.0052	1.0052	1.0052
30.0	1.0052	1.0053	1.0053	1.0053	1.0054	1.0054	1.0054

Inaccuracy (systematic error):

Inacccuracy is the difference between the dispensed volume and the selected volume of a pipette.
$A = \overline{V} - V_o$
A = inaccuracy
$\overline{V}$ = mean volume
V_o = normal volume
Inaccuracy can be expressed as a relative value A%= 100% x A/V°
imprecision (random error)
Imprecision refers to the repeatability of the pipetting. It is expressed as standard deviation (s) or coefficient of variation (cv)

$$S = \sqrt{\frac{\sum_{i=1}^{n} (V_i - \overline{V})^2}{n-1}}$$

s= standard deviation

v= mean volume
n= number of measurment
Standard deviation can be expressed as a relative value (cv)
CV = 100% x S/V

Maintenance:

When pipette is not in use, make sure it is stored in an upright position. We recommend a stand for this purpose .

Short term service:

The Pipette should be checked at the begining of each day for dust and dirt on the outside surface of the pipette. Particular attention should be paid to tip cone. No other solvents except 70% ethanol should be used to clean the pipette.

Long Term Service Single Channel Pipette:

If pipette is used daily it should be checked every three month. The servicing procedure starts with the disassembly of the pipette.

1. Press the tip ejector button and pull the tip ejector out (fig. 1)
2. Turn the tip cone counter clockwise to unscrew (fig.2).
3. Fix the service tool on the O-ring seat and turn clockwise to open. P ull out the O-ring seat and turn the tip cone upside down and retreive the O-ring.
4. Clean the tip cone for foreign particles.
5. Grease the cleaned parts with lubricant preferably silicon grease.

Reassembly:

For range 0.2-2 µl, 0.5-10µl, 5-10µl 5-50 µl, 10-100µl, 20-200µl.
• Place the O-ring in the tip cone and screw the O-ring seat with help of service tool.
• Place the spring on the piston and slide inside the tip cone.
• Screw the assembled tip cone in the main housing.
• Slide the tip ejector on the tip cone.
• Turn the tip ejector clockwise while forcing the ejector panel downwards.

Dis-assembly:

For 0.5-5µl, 1-10ml pull the lower position of the ejector to dis-engage from the upper portion.
Unscrew the tipcone from the main housing.
The tip cone is in two portion, the lower portion can be unscrewed from the upper portion to expose the piston. (fig.12)

Sterlization:

The entire pipette can be sterlized by autoclaving it at 121°C(252°F)(2ata) (minimum 20 minutes) No special preperation are needed for autoclaving. You can use stream sterlization bags if nedded.

After autoclaving, the pipette must be cooled to room temperature for at least two hours. Before pipetting, make sure that pipette is dry. We recommend that you check the calibration after every sterlization cycle to achieve the best possible accuracy.

Trouble shooting:

The table below lists possible problem and thier solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached Foreign particles between tip and tip cone Foreign particles between the piston, the o-ring and the cylinder Insufficient amount of grease on cylinder and o-ring, O-ring Damaged	Attach firmly Clean tip cones attach new tip Clean and grease O-ring and Cylinder Grease accordingly Change the O-ring
Inaccurate dispensing	Incorrect operation Tip incorrectly attached calibration altered caused misuse,for examples	Follow instruction carefully attach firmly Recalibration according to instructions
Inaccurate dispensing with certain liquids	Unsuitable calibration High viscosity liquids may require recalibration	Recalibration with the liquids in quistion

Package:

The Pipette is shiped in a specially designed package containing the following items.
1. Service Tool
2. Tip Sample
3. Instruction Manual
4. Calibration Certificate
5. Shelf Hanger

Caution:

The Pipette is designed to allow easy in-lab service. If you would prefer to have us or your local representative service your pipette, please make sure that the pipette has been decontaminated before you send it to us. Please note that the postal authorities in your country may prohibit or restrict the shipment of contaminated material by mail.

fig.1
Dis-assembling the tip ejector

fig.2
Dis-assembling the tip cone

fig.3
Dis-assembling the piston

fig.3 a
Dis-assembling the piston

fig. 4
Service Tool

fig. 5
Dis-assembling the O-ring seat

fig. 6
O-ring Seat & Service tool

fig. 7
Piston & Spring

fig.8

fig.9

fig.10

fig.11

fig.12

Operation Manual
MICROPIPETTE

Product Description

The Pipettes are continuously adjustable, general purpose micropipettes for sampling and dispensing accurate liquid volume.

It operates on Air displacement principle (i.e. an air interface is present between the piston and liquid) and uses detachable, disposable tips. Desired volume is determined by the following formula:

$V = pr^2h$

Where V= Desired Volume
r= radius of piston
h= vertical distance traveled by the plunger

Six Models Cover a range from 0.5 µl to 300 µl.

Digital display

The adjustable volume micropipettes are fitted with easy to read digital display.

Raw Material

The Pipettes are made of mechanically durable and autoclavable materials.

Pipette Operation

Setting the delivery volume

1.Set the delivery volume using the push button on the top of the pipette.
To increase the delivery volume, turn the push button counterclockwise. To decrease the delivery volume, turn it clockwise.
2. Make sure that the desired delivery volume clicks into place.
3. Do not set volume outside the pipette's specified volume range. Using excessive force to turn the push button outside the range may jam the mechanism and eventually damage the pipette.

Tip ejection

Each pipette is fitted with a tip ejector. This helps to eliminate the risk of contamination.
To eject the tip, point the pipette at suitable waste receptacle and press the ejector with your thumb.

Pipetting Techniques

Push and release the push button slowly at all times particularly when working with high viscosity liquids. Never allow the push button to snap back. Make sure that the tip is firmly attached to the tip cone. Check for foreign particles in the tip.
Before you begin your actual pipetting work, fill and empty the tip 2-3 times with the solution that you will be pipetting. Hold the pipette in an upright position while aspirating liquid. The grippy should rest on your index finger. Make sure that the tips, pipette and solution are at the same temperature.

Forward Technique

Fill a clean reagent reservoir with the liquid to be dispensed .
1.Depress the push button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 3-4 mm. and slowly release the push button. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second, continue to depress the push button all the way to the second stop. This action will empty the tip
4. Release the push button to the ready position. If necessary, change the tip and continue pipetting.

Reverse Technique

The reverse technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volumes.
Fill a clean reagent reservoir with the liquid to be dispensed.

1. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the present volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.

4. The remaining liquid should either be discarded with the tip or pipetted back in to the container.

RepetitiveTechnique

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume. Fill a clean reagent reservoir with the liquid to be dispensed.

1.Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching against the edge of the reservoir to remove excess liquid.
3. Deliver the preset volume by gently depressing the push button to the first stop. Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. Continue pipetting by repe ating step 3 and 4.

Pipetting of heterogeneous samples

for example,deproteinization in blood glucose determination
Use steps 1 and 2 of the forward technique to fill the tip with blood. Wipe the tip carefully with a dry clean tissue.
1. Immerse the tip into the reagent and depress the push button to the first stop, making sure the tip is well below the surface
2. Release the push button slowly to the ready position. This will fill the tip. Keep the tip in the solution.
3. Depress the push button to the first stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the push button all the way to completely empty the tip.

Calibration and adjustment

All pipettes are factory calibrated and adjusted to give the volume as specified with distilled or deionized water using the forward pipetting technique. It should be noted that the use of other pipetting techniques may affect the calibration results. The pipettes are constructed to permit re-adjustment for other pipetting techniques or liquids of different temperature and viscosity.

Device requirements and test conditions

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of the pipette.

Volume Range Readablity

Graduation under 10 µl	0.001 mg
10 100 µl	0.01 mg
above 100 µl	0.1 mg

Test liquid Water, distilled or deionized “grade 3” water conforming ISO 3696. Tests are done in a draft-free room at a constant (±0.5°C) temperature of water, pipette and air between 15°C to 30°C. The relative humidity must be above 50%. Especially with volumes under 50 µl the air humidity should be as high as possible to reduce the effect of evaporation loss. Special accessories, such as the evaporation trap, are recommended.

Procedure to check calibration

The pipette is checked with the maximum volume (nominal volume) and with the minimum volume. A new tip is first pre-wetted 3-5 times and a series of ten pipetting is done with both volumes A pipette is always adjusted for delivery (Ex) of

the selected volume. Use of forward pipetting technique is recommended. The maximum permissible errors are designed for forward method.

Procedure

1. Do 10 pipetting with the minimum volume.
2. Do 10 pipetting with the maximum volume.
3.Calculate the inaccuracy (A) and imprecision (cv) of both series.
4.Compare the results to the limits in the Table 1
If the calculated results within the selected limits, the adjustment of pipette is correct

volume range	vol. µl	Acc. ±%	CV. ±%
0.5-10µl	1	16	10
	5	3.2	2
	10	1.6	1
02-20µl	2	8	4
	10	1.6	0.8
	20	0.8	0.4
05-50µl	5	8	4
	25	1.6	0.8
	50	0.8	0.4
10-100µl	10	8	3
	50	1.6	0.6
	100	0.8	0.3
20-200µl	20	8	3
	100	1.6	0.6
	200	0.8	0.3
40-300µl	40	8	3
	150	1.6	0.6
	300	0.8	0.3

Adjustment

Adjustment is done with the service tool.
1. Place the service tool into the openings of the calibration nut at the top of the handle
2.Turn the service tool clockwise to increase, or counterclockwise to decrease the volume
3.After adjustment check the calibration according to the instructions above.

Formulas for calculating results
Conversion of mass to volume

V= (w+e) x Z
v= volume (µl)
w= weight (mg)
e= evaporation loss (mg)
z= conversion factor for µl/mg

Conversion

Evaporation loss can be significant with low volumes. To determine mass loss, dispense water to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds (i.e. 6mg = 0.2 mg/s) Compare this to the pipetting time from taring to reading. Typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2mg/s) in this example. If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary.
The factor Z is for converting the weight of the water to volume at test temperature and pressure A typical value is 1.0032 µl/mg at 22°C and 95 kPa.

See the conversion table below.

Temperature °C	Air pressure kPa						
	80	85	90	95	100		
15.0	1.0017	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020
15.5	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020	1.0021
16.0	1.0019	1.0020	1.0020	1.0021	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0021	1.0022	1.0022	1.0022
17.0	1.0021	1.0022	1.0022	1.0022	1.0023	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024	1.0024
18.0	1.0022	1.0023	1.0023	1.0024	1.0025	1.0025	1.0025
18.5	1.0023	1.0024	1.0024	1.0025	1.0025	1.0026	1.0026
19.0	1.0024	1.0025	1.0025	1.0026	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0027	1.0028	1.0028
20.0	1.0026	1.0027	1.0027	1.0028	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0029	1.0030	1.0030
21.0	1.0028	1.0029	1.0029	1.0030	1.0031	1.0031	1.0031
21.5	1.0030	1.0031	1.0031	1.0031	1.0032	1.0032	1.0032
22.0	1.0031	1.0032	1.0032	1.0032	1.0033	1.0033	1.0033
22.5	1.0032	1.0033	1.0033	1.0033	1.0034	1.0034	1.0034
23.0	1.0033	1.0034	1.0034	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0036	1.0037
24.0	1.0035	1.0036	1.0036	1.0037	1.0037	1.0038	1.0038
24.5	1.0037	1.0038	1.0038	1.0038	1.0039	1.0039	1.0039
25.0	1.0038	1.0039	1.0039	1.0039	1.0040	1.0040	1.0040
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0041	1.0042
26.0	1.0040	1.0041	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0043	1.0043	1.0043	1.0044	1.0044	1.0044
27.0	1.0043	4.0044	4.0044	4.0045	4.0045	4.0045	4.0046
27.5	4.0045	1.0046	1.0046	1.0046	1.0047	1.0047	1.0047
28.0	1.0046	1.0047	1.0047	1.0047	1.0048	1.0048	1.0048
28.5	1.0048	1.0048	1.0048	1.0049	1.0049	1.0050	1.0050
29.0	1.0049	1.0050	1.0050	1.0050	1.0051	1.0051	1.0051

Inaccuracy (systematic error)
Inaccuracy is the difference between the dispensed volume and the selected volume of a pipette.
$A = V - V_0$
A = inaccuracy
V = mean volume
V_0 = nominal volume
Inaccuracy can be expressed as a relative value
$A\% = 100\% \times A / V_0$
Imprecision (random error)
Imprecision refers to the repeatability of the pipetting. It is expressed as standard deviation (s) or coefficient of variation (cv)

$$S = \sqrt{\frac{\sum_{i-1}^{n} (V_i - \bar{V})^2}{n-1}}$$

s=standards deviation
v=mean volume
n=number of mesurements

Standard deviation can be expressed as a relative value (CV) $CV = 100\% \times S / V_1$

Sterlization

The entire pipette can be sterlized by autoclaving it at 121°c (252°F)(minimum) 20 minutes) no special preprations are needed for autoclacing. steam sterlization bags can be used if needed,
must be cooled to room temperature for atleast two hours. before pipetting, make sure that the pipette is dry.
We recommended that you check the calibration after every sterlization cycle to achive the best possible accuracy.

Trouble Shooting

The Table below lists possible problem and thier solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached Foreign particles between tip and tip cone Foreign particles between the piston, the o-ring and the cylinder Insufficient amount of grease on cylinder and o-ring, O-ring Damaged	Attach firmly Clean tip cones attach new tip Clean and grease O-ring and Cylinder Grease accordingly Change the O-ring
Inaccurate dispensing	Incorrect operation Tip incorrectly attached calibration altered caused misuse,for examples	Follow instruction carefully attach firmly Recalibration according to instructions
Inaccurate dispensing with certain liquids	Unsuitable calibration High viscosity liquids may require recalibration	Recalibration with the liquids in quistion

Package

The pipette is shipped in a specially designed package containing the following items.
1.The Pipette
2.Service Tool
3.Tip Sample
4.Instruction manual
5.Calibration certificate
6.Shelf hanger
7.Reagent Trough

CAUTION

The is designed to allow easy in-lab service. If you would prefer to have us or your local representative service your pipette, please make sure that the pipette has been decontaminated before you sent it to us.

Please note that the postal authorities in your country may prohibit or restrict the shipment of contaminated material by mail.

Operation Manual
MICROPIPETTE

SPECIFICATIONS & ORDERING INFORMATION

Model No.	Capacity	Increment	Accuracy		CV	
			±%	± µl	±%	± µl
TI - 10	10ml	0.002 ml	0.2	20	0.07	7
TI - 25	25ml	0.05 ml	0.2	50	0.07	17.5
TI - 50	50ml	0.01 ml	0.2	100	0.05	25

SPECIFICATIONS & ORDERING INFORMATION

Model No.	Vol. Range	Increment	ISO 8655 Specifications				Microlit Specifications			
			Accuracy		CV		Accuracy		CV	
			±%	± ml	±%	± ml	±%	± ml	±%	± ml
BEAT-2.5	0.25-2.5 ml	0.05 ml	0.6	0.015	0.2	0.005	0.6	0.015	0.2	0.005
BEAT-5	0.5-5 ml	0.1 ml	0.6	0.030	0.2	0.010	0.5	0.025	0.1	0.005
BEAT-10	1-10 ml	0.2 ml	0.6	0.060	0.2	0.020	0.5	0.050	0.1	0.010
BEAT-30	2.5-30 ml	0.5 ml	0.6	0.180	0.2	0.060	0.5	0.150	0.1	0.030
BEAT-60	5-60 ml	1.0 ml	0.6	0.360	0.2	0.120	0.5	0.300	0.1	0.060
BEAT-100	10-100 ml	2.0 ml	0.6	0.600	0.2	0.200	0.5	0.500	0.1	0.100

TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Liquid dripping from the Pipette	Pipette is not firmly fixed	Check the fitment.
	Leakage in the collet assembly	Ensure proper fitment of Collet
	Leakage from the inside connections	Send the instrument to your nearest dealer
Pump is not functioning	Battery is discharged	Charge the battery
	Connection is broken	Send the instrument to the nearest dealer
	Speed controller is on the Lowest position	Adjust speed controller

ROUTINE SERVICING :

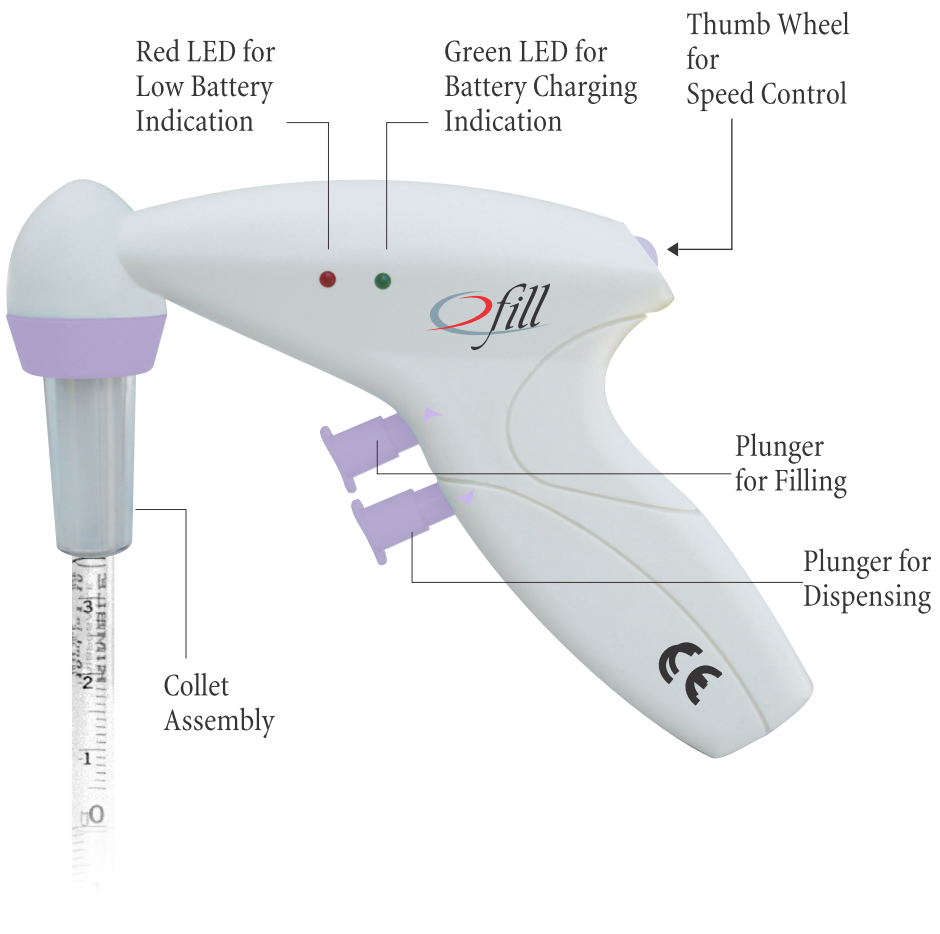
The liquid may accidentally enter into the collet assembly and choke the filter. In this event, unscrew the collet assembly from the body and change the filter. Replace collet assembly and start working normally.

WARNING :

- During charging ensure that the battery charger is set on proper voltage as per the line voltage.
- Battery should not be allowed to discharge completely.
- Pipette should be firmly fixed to avoid accidental fall during operation.
- Care should be taken during aspiration to avoid liquid entering into the collet assembly.
- Fuming liquids and solvents should be avoided as dripping will occur and the fumes might damage the inside components of the instrument.

Accessories : Adaptor for Battery Charging
Specification : Input : 100 -250 V
Output : 9 V

PRODUCT



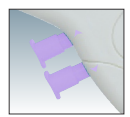
GENERAL DESCRIPTION OF THE PRODUCT :

It is a Scientific Laboratory equipment used for filling and dispensing liquid in graduated and one-mark pipettes from 0.1ml to 100ml. It is a pump operated instrument and offers a safe, efficient and easy alternative for mouth and finger tip pipetting.

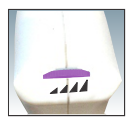
PRODUCT FEATURES :

- Suitable for Pipettes of 0.1ml to 100ml size.
- 0.2um PTFE hydrophobic filter is provided in the collet assembly to avoid liquid entering the instrument body.
- Inside collet knurlings facilitate tight fit even with wet pipettes.
- High aspirating and flow-out speed.
- Single finger control for the Flow-out and blow-out functions.
- Cordless work for up to eight hours, continuing directly after recharging.
- Autoclavable pipette adapters and filter holders.
- Charging status and battery status is indicated on the body by red and green L.E.Ds.

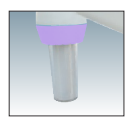
OPERATION :



FILLING AND DISPENSING : Insert the pipette (Glass or Plastic) into the collet. The inside knurlings allows a tight fit. Press the upward plunger to aspirate liquid into the Pipette and downward plunger for dispensing. The upward and downward mark next to the plunger allows easy identification.

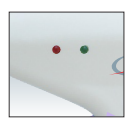


SPEED CONTROL : Thumb wheel is provided at the back of the instrument which can be easily identified. Clockwise motion increases the pump speed and anti-clockwise motion reduces the pump speed. User can adjust the speed according to his or her convenience.



AUTOCLAVING : Collet assembly is fully autoclavable. It contains a 0.2um hydrophobic fiter which is also autoclavable at 120 C and 15psi pressure. For autoclaving unscrew the collet assembly for direct autoclaving.

Note : Only Collet assembly is Autoclavable and NOT the full instrument.



BATTERY STATUS AND CHARGING STATUS : Low battery charge is indicated when the red L.E.D is continuously illuminated. Green L.E.D. will be continuously illuminated at the time of charging.

Note : Instrument can be used during charging also.

SPECIFICATIONS & ORDERING INFORMATION

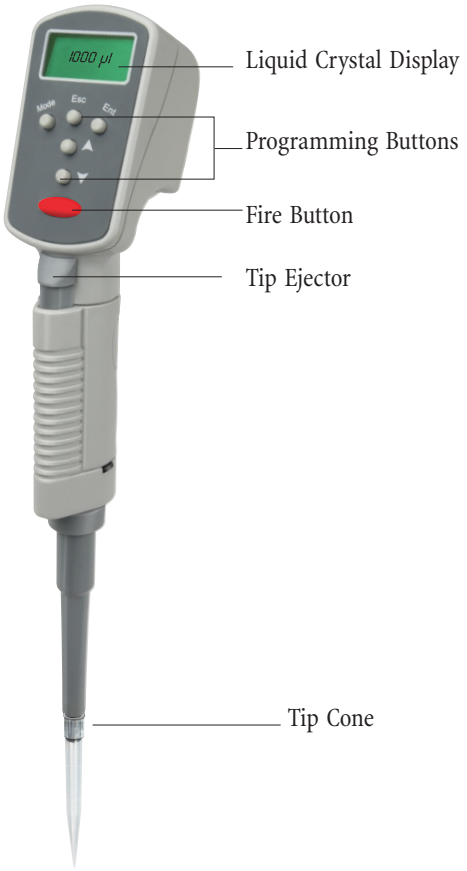
Pipette Filling Device

Model	Desription
NE-WG	White body/ Grey collet and plunger
NE-WV	White body/ Violet collet and plunger
NE-WR	White body/ Red collet and plunger

Operation Manual

ELECTRONIC MICROPIPETTE

Operation Manual



GENERAL DESCRIPTION OF THE PRODUCT

Electronic Micropipettes are Medical and scientific laboratory equipment used for dispensing small quantities of fluids or liquids. It has movable parts made up of steel and plastic and uses detachable tips to hold the samples. Micropipette works on air displacement principle and uses the following formula :

$V = \pi r^2 h$

Where V is the desired volume being used for Pipetting.

These micropipettes are designed for use in Medical, Educational Research, Diagnostics, Clinical Pathology, Blood Banks handling human blood samples.

Ergonomic Aspect : Pipette is designed ergonomically with following features :

Angled Upper body ensures comfortable grip for stress free long duration continuous working.

Light weight design to ensure less fatigue during operation.

Smooth edges to ensure that the gloves do not snag while working.

Body design ensures proper thumb position on the fire button and tip ejector.

Large Liquid Crystal Display is provided for ease of visibility during volume setting and operation.

KEY FEATURES

These micropipettes are designed for easy operation and maximum accuracy conforming to ISO 8655 standards.

Available in various volume ranges and sizes to cover the pipetting range from 0.2ml to 10000ml.

Separate, streamlined 'tip ejector' ensures no accidental de-tipping during use.

Calibration Menu is provided for easy user re-calibration.

User friendly software with three modes :

- Standard mode
- Step mode
- Dilution mode

Serviceable and easy to disassemble.

Each pipette is individually calibrated conforming to ISO 8655 standards. A calibration report is provided with each pipette.

The constructional design and the materials used for their manufacture is chosen in such a way that any heat transmitted from the user's hand to the apparatus during period of use or test is in accordance with ISO 8655-6 and can be ignored.

Specifications :

Sl.No.	Model No.	Volume Range
1.	ME-10	0.2 - 10ul
2.	ME-120	5 - 120ul
3.	ME-300	20 - 300ul
4.	ME-1000	50 - 1000ul
5.	ME-5000	100 - 5000ul

Pre-Use Instructions :

Ensure that the box is shrink packed.

Ensure that the volume of the pipette is as per the label outside.

Ensure that the date of manufacturing is not older than five years.

Ensure that the pipette is not damaged physically.

Ensure that the accessories in the box are as per the label outside.

Ensure that the calibration report and instruction manual is present in the box.

GENERAL INSTRUCTIONS FOR OPERATION :

Introduction :

SWITCHING ON THE PIPETTE : There is no ON/OFF switch on the pipette. If the pipette is left idle for more than 2minutes it goes in sleep mode (this saves battery charge). To re-boot the pipette press any key on the keyboard. The pipette displays company name and serial number of the instrument, this disappears in a short while and the pipette comes back to the operation which was being performed before it went in sleep mode. User can now restart work on the originally set parameters.

Incase the parameters need to be changed, the user has three pipetting options as follows :

Standard mode : To set a volume and perform standard fill/dispense operation.

Dilution mode : To fill two liquids in different volumes with air gap in between and dispense all at once.

Stepper mode : To fill large volume initially and dispense in desired number of steps of equal volumes.

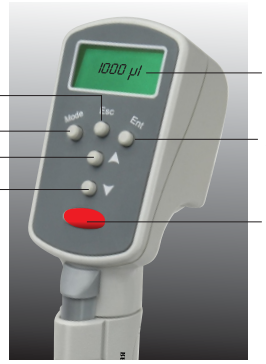
Charging the battery :

1. Simply connect the AC/DC Adapters to a compatible AC outlet and to the pipette. Charging is indicated on display as shown in the picture.

2. If the pipette is new or the battery charge is low, keep the pipette connected to the charging adaptor for 12 hours to fully charge the pipette before use.

3. The pipette can be charged in both working and sleeping modes. The pipette can be used during charging also.

Operation :



Press [Esc] once or twice until the display shows

Press [Ent]

The display will show last operated Mode and volume.

If same settings are to be retained press [Ent] and start working.

If settings are to be changed then

Press [Mode] : display shows

Press [up/down] key to get the desired mode on the display.

Press [Ent]

Case I : Std Mode is selected

Display shows a volume.

Press [up/down] to arrive at desired volume

Press [Ent]

Display shows

Press [Up/Down] to select desired speed from 1-5

(Note : Default recommended speed is 3.)

Press [Ent] to select the speed.

Display will now show the selected mode and volume, if everything is as per settings : Press [Ent] (Otherwise press [Esc] and start again.)

Display will show an upward arrow ▲ indicating that the pipette is ready to fill.

Press [Red fire button] while the tip is dipped in the liquid to fill the liquid.

Liquid will be filled in the tip. As soon as the filling is over display shows a ▼ downward arrow. Pipette is now ready to dispense.

Press [Red Fire button] to dispense the liquid. After dispensing the pipette will again be ready to fill and the operation can be repeated.

Case II : Dilution Mode is selected

Display will show

Press[Up/Down] to select volume of the first liquid

Press [Ent]

Display will show

Press [Up/Down] to select the volume of air gap between the two liquids.

Press [Ent]

Display will show

(Note : Sum of all three volume cannot be more than the volume range of the pipette.)

Press [down] to select volume of the second liquid

Press [Ent] at desired volume

Display will show

Press [Up/Down] to select speed

Press [Ent] at desired speed

Display will confirm the mode and two volumes. If everything is as per your setting

Press [Ent]

Upward arrow ▲ will appear on the display.

Put the tip in the first liquid and

Press [Red Fire button]

First liquid is filled in the tip

Display will show air with an upward arrow ▲

Press [Red Fire button] keeping the tip in air

Air is sucked in the tip

Display shows the second volume with upward arrow. ▲

Put the tip in the second liquid

Press [Red Fire button]

Second liquid is filled in the tip.

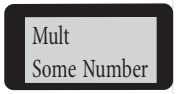
Display shows a downward arrow ▼

Press [Red Fire button] to dispense both liquids together.

The pipette is again ready to repeat the procedure.

Case III : Stepper mode is selected

Display shows



Press [Up/Down] to select the desired number of multiples.

Press [Ent]

Display shows maximum volume each multiple can have according to the range of the pipette

Press [Down] to select the desired volume of each multiples

Press [Ent]

Display will show

Press [Up/Down] to select speed

Press [Ent]

Display will confirm the mode and volume. If everything is as per setting.

Press [Ent]

Upward arrow ▲ will appear on the display. The pipette is now ready to fill the total amount.

Dip the tip in the liquid and

Press [Red fire button].

Liquid will be filled in the tip. As soon as the filling is over we will see **number of multiples X volume** and a downward arrow ▼ on display. The pipette is now ready to dispense in steps.

Press [Red fire button].

First dispensing is done and number of multiples on the display is reduced by 1 Press [Red fire button] again

Until the display shows LDO (last drop out) Discard this liquid by keeping the tip in the original container

Press [Red fire button] to dispence LDO (Last drop out).

Pipette is again ready to repeat the procedure.

Re-Calibration of Pipette

The pipette comes calibrated from the company accompanied with complete calibration report, which includes actual calibration data, % inaccuracy and % CV as per ISO 8655 standards.

However, in the following cases re-calibration by the user is recommended.

1. Since the pipette is calibrated using degassed, double distilled water as per ISO 8655 standards, it is recommended to recalibrate the pipette when working on detergent or foaming liquids, high viscosity liquids like oil etc..
2. In the event of disassembling the pipette for servicing, greasing, o-ring replacement etc.
3. Pipette is calibrated under laboratory conditions at 20-25 C, 50% relative Humidity and Atmospheric pressure 760mmHg. It is recommended to recalibrate the pipette if the working conditions are different from those mentioned above.

Note : Volume variation up to 0.3 % may result due to change in temperature (25^0C to 45^0 C), relative humidity and atmospheric pressure.

Re-Calibration Procedure

Equipments required :

Electronic Balance (Readability : 0.01mg)

Double distilled water

Small container

Procedure

Put the small container on the weighing pan of the electronic balance and tare the balance to 0.00

Press [Esc] until display shows 

Press [Up/Down] to select Menu Cal

Press [Ent] when display shows 

Display will show a pre-set volume with an upward arrow. ▲

The pipette is ready for calibration.

Immerse the tip into the distilled water and

Press [Red fire button].

Water is aspirated in the tip. (The display shows a downward arrow.) Carefully dispense the liquid in the container placed on the tared Electronic Balance . Note the reading on the balance readout.

Feed this reading into the pipette by Pressing [Up/Down] key and Press [Ent]. The pipette is calibrated. 

Display shows

Check the calibration.

If further re-calibration is required

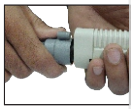
Press [Ent] and repeat the above procedure till you get the same reading on the balance as the preset value on the Pipette display.

To Exit Menu Cal

Press [Up/Down] key to reach Menu Prog and continue working.

In - house Maintenance :

Piston Cleaning and Tip-cone replacement



1) Remove the tip ejector : Gently pull the tip ejector and slide it off.

2) Remove tip cone : Unscrew the tip cone from the main body and gently pull it out to expose the piston.

This metal piston should be cleaned with a soft tissue. Gently mount the tip cone back on the piston and screw to its original position. Slide the tip ejector back and press gently, it will fit on the main housing with a click sound.

Note : Pipette must be re-calibrated after maintenance. Follow the re-calibration procedure.

3) In case the problem still persists the tip cone assembly should be replaced. This is available as a spare part.

ACCURATE PIPETTING

1. Always clean the tip-cone with dry tissue paper before fixing the tip.
2. Ensure that the tip is firmly fitted.
3. The solution and the tip should be at the same temperature.
4. Always reject initial 3/4 dispersing before starting your work.
5. Always keep the pipette upright.
6. Reject the tip if any liquid is sticking on the inner wall of the tip.

Trouble Shooting

Trouble	Possible Cause	battery Solution
Screen blank. (LCD Display)	Pipette is in sleep mode.	Press any button to start.
	Battery charge low.	Charge the battery and start by pressing any button. Note: If the problem still remain contact distributor.
	Tip is not compatible.	Use standard tips.
Low volume filling.	O-ring damage.	Change Tip-cone (follow In-House maintenance.)
	Calibration not proper.	Re-calibarte (follow instruction in calibration procedure.)
Battery not charging while charging sign displayed on the screen.	Battery life is finished.	Change battery. (Contact distributor.)
Battery charging sign not displayed when adaptor is connected to the mains.	Adaptor is loosely connected.	Check connections.
	Adaptor not working properly.	Contact distributor or use any 9V DC adaptor.

SAFETY AND STORAGE INSTRUCTIONS

1. Pipette should not be left on the working platform with tip attached to it. There is a likelihood of the liquid flowing inside the tip-cone.
2. Care must be taken while ejecting the tips. The tips are ejected with a jerk and should be directed towards the waste bin only.
3. The pipette must not come in contact with any organic solvent, flame or direct heat. This may effect the plastic body of the pipette.
4. It is not recommended to use organic solvents or liquids with high vapour pressure with this micropipette. These liquids do not hold in the tips and dripping from the tips may result.
5. Precaution must be taken while working with strong chemicals like acids or alkalies. Use of gloves and eye glass is recommended to avoid accidents while working.
6. This micropipettes has built-in tip ejector and simple adjustments which does not trap the gloves of the user during operation. However, care must be taken to ensure that the gloves are not breached resulting in any accident hazard.
7. This pipette is meant for re-use. Tip cones must be properly cleaned with a filter paper each time the tips are ejected from the tip-cones.
8. Upon request, information regarding the reaction of the materials of the pipette with organic and inorganic solutions and solvents shall be provided by the manufacturer.
9. The pipette must be kept in the box after use.

Warning:

1. Bio contamination is possible. While working on very sensitive applications like tissue culture, clinical chemistry and human blood samples etc.
2. Follow storage instructions carefully.
3. Follow caution messages carefully.
4. The pipette is supplied in non-sterile condition.
5. Tips used with this pipette are meant for single use only. They must not be cleaned for re-use as their metrological characteristics will no longer be reliable.

CE

Microlit

ISO 9001 : 2008 CERTIFIED

Li'lpet

FIXED VOLUME
MICROPIPETTE

LOW PRICE

HIGH PRECISION

HIGH ACCRACY

2 STEP PLUNGER

UNIQUE TIP CONE

FULLY AUTOCLAVABLE

Technical Specifications :

Model	Capacity	±%Accuracy	±% CV
MM - 5	5 µl	1.5	1.0
MM - 10	10 µl	1.0	1.0
MM - 20	20 µl	0.5	0.5
MM - 25	25 µl	0.5	0.5
MM - 50	50 µl	0.4	0.3
MM - 100	100 µl	0.3	0.3
MM - 200	200 µl	0.5	0.5
MM - 250	250 µl	0.5	0.5
MM - 500	500 µl	0.5	0.5
MM - 1000	1000 µl	0.5	0.5

Features :

- **OPTIMUM SIZE**
  Microlit Lil'pet is 130 mm in length which is optimum size to facilitate the user in handling the Microlit Li'lpet like a standard pipette and not like a syringe
- **COLOR-CODED**
  Color-coded for various capacities for easy identification in laboratory environment
- **UNIQUE TIP CONE**
  Unique tip cone design to accept both micro tip (200µl) and ultra micro tip in pipettes upto 20 µl.
- **TWO-STAGE PLUNGER**
  Two-stage plunger movement ensures high accuracy and precision in pipetting technique. This also facilitates last drop dispensing.
- **FULLY AUTOCLAVABLE**
  Microlit Li'lpet is fully autoclavable at 121°C & 15 psi for sensitive application.

Microlit