

**RAININ**

Pipetting 360°

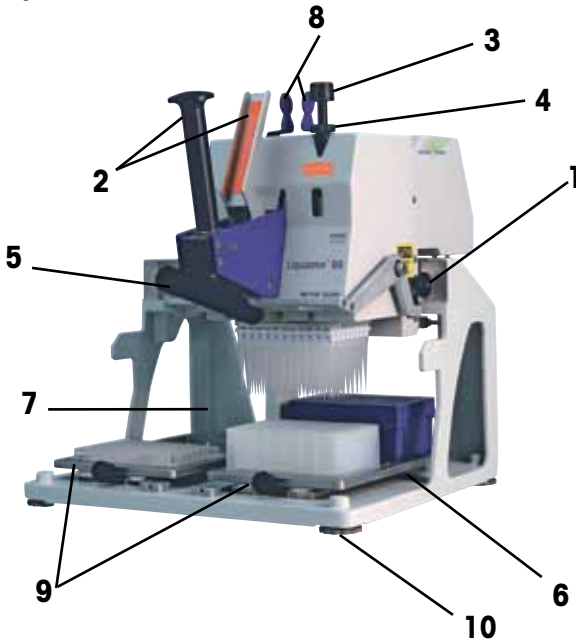
# Liquidator™ 96

Manual benchtop pipetting system



**METTLER TOLEDO**

## Liquidator 96 Controls



1. Transport lock
2. Pipetting grip & lever
3. Volume selector
4. Volume lock
5. Tip mounting lever
6. Tip rack position
7. Adjustable height post
8. Tip ejector levers
9. Moveable plate holder
10. Adjustable feet (6)

## Warnings, Safety Notices



Liquidator 96 is for research purposes only. If used for other purposes RAININ will not be liable for resulting damage.



Always use safe laboratory practices when working with Liquidator 96. Do not work directly under the pipetting head. Move it over to have free access to the working place required.



Never move Liquidator 96 without first locking the pipetting head – see manual for details.



Pipetting strong acids, bases or other aggressive liquids may damage seals, nozzles, or other parts of Liquidator 96. Avoid allowing any such liquids to contact Liquidator 96 or enter the nozzles. Clean up any contamination or accidental splashes of aggressive liquids immediately.



Follow the instructions in this manual for safe long-term operation. Keep the manual close to the instrument for reference purposes. It is the responsibility of the user to follow this instruction manual and to work in accordance with the standard operating procedures and general safety guidelines set up for the particular workplace.

## Contents

Introduction, .....	1
Unpacking,Unlocking and Locking Head .....	2
Leveling Liquidator 96.....	3
Environment.....	3
Height Adjustment Posts.....	3
Operation.....	4
Clean Operation.....	9
Recommendations for Pipetting.....	9
Maintenance and Safety .....	10
Dimensions, Specifications.....	10
Ordering Information .....	11
Warranty.....	11
Appendix - Using the 384-Well Adapter.....	12

## Introduction

Ideal for high throughput applications, Liquidator 96 is a manual benchtop pipetting system with 96 separate channel nozzles in an 8 x 12 microtiter plate standard pattern.

Liquidator 96 operates following the same operational principles as a handheld air-displacement pipette except the pipetting head can be moved along a vertical (z) and a horizontal (x) axis for whole-plate pipetting. The pipetting head will only move in the x axis when it is in the fully up position.

Two plate holders, each with two working positions, move in a horizontal (y) axis and allow a maximum of three different plates with SBS footprint to be used simultaneously.

Adjustable feet at each corner of the base and under each tip loading position allow you to operate Liquidator 96 in a perfectly level position, and provide support to prevent the unit flexing when mounting tips.

The rear positions of the right and left plate holders (right side (6) shown opposite) each retain the specially-designed Liquidator 96 Tip Rack. Liquidator 96 works only with Liquidator LTS tips. See page 10 for tip information.

## Unpacking

It is recommended that you follow exactly the steps outlined in the separate publication 9920-363, Unpacking/Repacking Instructions, Liquidator 96.

It is critically important to follow the steps for repacking whenever the unit is to be shipped or transported to a new location. It is highly recommended to keep all the packaging material.

## Unlocking the Liquid Head

The Liquidator 96 pipetting head incorporates a locking device to prevent uncontrolled movement of the head during movement, say between labs, or from a bench to a laminar flow cabinet.

Release a locked head as follows: Pull the black knob of the transport lock (1) on the right side of the device and turn it about 15° so it stays in the “out” position, sticking out about 1 cm. This allows the pipetting head to move; check free movement by moving the head up and down.

## Locking the Liquid Head

The pipetting head must be secured each time Liquidator 96 is moved, even from bench to bench:

- Move the pipetting head fully to the right or left and down to the end position and hold it in this position.
- Pull the black transport lock knob on the right side and turn it about 15° to the “locked” position. When you release it, you will hear the transport lock click into place, indicating that the pipetting head is safely locked – the knob will be in the “in” position. See below.
- Never move Liquidator 96 without locking the pipetting head. Any damage to the Liquidator 96 caused by movement with the head unlocked is not covered by the warranty.



PRESS LIQUID HEAD  
DOWN, TURN AND  
RELEASE LOCKING KNOB

## Levelling Liquidator 96

Six adjustment feet (10) are provided on the Liquidator 96 base to allow you to level the instrument, and to provide support for tip loading. You can determine whether the instrument is level by placing a plate of water on the base, and adjusting the feet so that the surface of the water in the plate is level.

Or check the level by moving the liquid head to the center of the horizontal rail. If the head moves toward one side, twist the adjustment feet on that side clockwise to raise and counterclockwise to lower. Repeat as necessary until the head does not move when released.

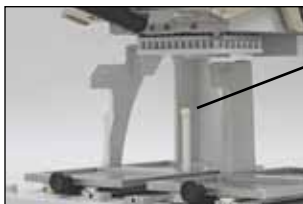
## Environment

Liquidator 96 should be placed level in a dry and clean place avoiding direct sunlight or air-conditioner fans. Liquidator 96 can be operated on a bench or in a laminar flow cabinet; the small footprint means you can use it almost anywhere.

The recommended ambient temperature is 20-25° C. Any sudden temperature or humidity changes (such as a draft from an air-conditioner fan, or sunlight from a window) may lead to a loss of precision. Before operation allow the instrument to adjust to ambient conditions (temperature and humidity) for at least 24 hours. Equilibration for Liquidator 96 will require a longer time than usual for conventional pipettes.

## Height Adjustment Posts – LIQ-AP

The vertical position of the tips can be limited by individual adjustable posts. Using these posts, the tip end height is limited to prevent tip ends reaching the bottom of the plate, e.g. to prevent self-sealing or possible destruction of coatings or cell layers. Screw the bottom of the post into the thread in the plate holders. Then use the adjustment screw at the top end of the post to set the desired height.



ADJUSTMENT SCREW AT  
END OF POST

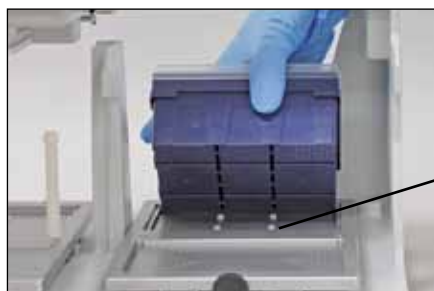
## Operation

Liquidator 96 is designed for simple ergonomic operation similar to conventional manual pipettes from RAININ. It is simple to understand routine operation and to work efficiently with the device.

### 1. Tip Mounting (photos show right plate use. Left plate similar)

- a) With the transport lock (1) unlocked, move the pipetting head smoothly up and to its full left or right position. Slide the right (or left) plate holder fully forward and place a new Liquidator 96 LTS tip rack onto the rear working position (6).

Make sure that the tip rack is correctly positioned, using the four alignment stubs in the base plate which lock into the channels in the base of the tip rack. See below.



ALIGNMENT  
STUBS  
IN TIP TRAY

- b) Now move the pipetting head smoothly to its right or left position. Ensure that the tip rack is correctly aligned and the tray as well as the pipetting head are fully in their end positions. Move the pipetting head down so the nozzles enter the tips. The two levers (8) on the tip ejection mechanism move outwards, indicating that the nozzles of the pipetting head are inserted correctly into the tips.



NOZZLES NOT SEATED IN TIPS



NOZZLES FULLY SEATED IN TIPS

- c) Firmly press down the tip mounting lever (5) to fully mount the tips on the nozzles.

This requires a specific amount of pressure on the mounting lever – you are mounting 96 tips at the same time. You should feel a distinct “lock” as the tips are mounted firmly to the nozzles. A quick, sharp insertion is recommended for best results. (If too much force is required, check for proper alignment of nozzles and tips).



### **Always watch the tip ejecting grips (8) when mounting tips!**

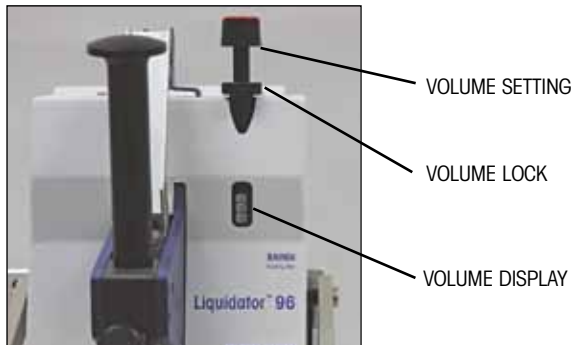
These grips are an indication of proper tip mounting – they move outward when you move the pipetting head downwards onto the tip rack to pick up fresh tips, showing that the nozzles are aligned properly into the tips.

- Do not press the tip mounting lever down (5) until the grips (8) have moved slightly outwards as you move the pipetting head onto the tip rack.
- As soon as the grips (8) have moved outwards completely, tips are fully mounted and you should release pressure on the tip mounting lever (5).

With the tips fully mounted, move the pipetting head up and the plate holder fully back, and place a vessel containing your liquid sample in the working position in front of the tip rack. After doing so the tips should be directly above the sample vessel.

## **2. Adjustment of pipetting volume**

The volume is set and indicated by the volume selector (3) which must only be used while the pipetting lever (2) is squeezed.



**Do not adjust the volume selector (3) without squeezing the pipetting lever (2).**

Selecting volumes is done in a similar way as for RAININ manual pipettes. First unlock the volume lock by twisting it counterclockwise a couple of turns. Adjust the volume a few  $\mu\text{l}$  higher than the target, then adjust down to the exact volume, to minimize the effects of mechanical backlash. Then twist the volume lock to secure the set volume.



**Never force the volume selector beyond its limits as this may damage the mechanism.**

### 3. Liquid Aspiration

Gently squeeze the pipetting lever (2) until the first stop.



Note: Like a conventional manual pipette, the first stop is an indicator that the set volume is ready to be aspirated; the second stop is the blowout position when dispensing.

Move the pipetting head down slowly until the tip ends are immersed into the liquid to a depth of about 2-4 mm. Allow the lever (2) to slowly move to the “open” position while the liquid is aspirated into the tips. Do not release the lever suddenly, which would aspirate sample too quickly and possibly draw air into the tip. Pre-rinsing – filling and emptying the tips 2 or 3 times – is highly recommended and often leads to better results.

If using chilled samples it is recommended to chill the tips to the same temperature before use, for best results.



Note: the vertical position of the tips can be limited with the Height Adjustment Post shown on page 3.

When the set volume of the sample is fully aspirated, allow the counterweighted pipetting head to rise clear of the sample, as shown below.

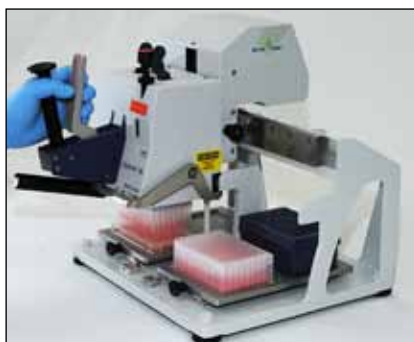


#### 4. Dispensing

Place a 96-well tray on the front tray on the plate holder and move the plate holder fully back for proper alignment.

Move the pipetting head to position it over the target plate. Carefully and slowly lower the head so that the tip ends are in or close to the wells but not touching the well bottoms. The height adjustment post can be used to limit the travel of the pipetting head.

Dispense the liquid by slowly squeezing the lever (2) to the first stop. Dispensing too quickly may cause splashing.



**Mixing in the tip can be performed by repeatedly pulling the lever to the first stop and then releasing the lever.**

The blowout stroke removes the residual liquid remaining in the tips. To blowout, squeeze the lever (2) to the second stop.

#### 5. Tip ejection

- a) Move the pipetting head over an empty tip rack and downwards until the tip ends slide into the holes of the rack.
- b) Squeeze together the two tip ejection levers (8) on top of the pipetting head to eject the tips into the used rack.



**To reuse empty racks do not eject used tips into the tip rack but into another suitable container, e.g. a used deep well plate.**

### 384-Well Adapter – LIQ-384PA

This adapter holds a 384 well plate and allows the plate to move into four discrete positions so that all 384 wells can be filled with four passes of a 96-place tip array. To access all the wells the 384-well plate is moved fully into each of the four corners of the adapter.



384-WELL ADAPTER



384-WELL PLATE IN ADAPTER

1. Place the 384-well plate into the adapter and move it fully into one corner.
2. Carefully align the tip ends into 96 of the wells and dispense 96 samples into the wells.
3. Move the 384-well plate to the next corner.
4. Move the tips to the sample vessels and aspirate sample.
5. Dispense into the next 96 wells.
6. Repeat until all wells are filled.

See Appendix (p.12) for more information on 384-well adapter.

## Clean Operation

Liquidator 96 may be operated in a laminar flow cabinet. To prepare Liquidator 96 wipe the surface of the device with alcohol or a suitable non-toxic and non-corrosive laboratory disinfectant.



**Do not expose Liquidator 96 to UV radiation more than necessary, and never overnight. The radiation and ozone generated may damage the finish and compromise sealing.**



**Do not autoclave any parts of Liquidator 96. Never use autoclaved tips or racks. The tips as well as the racks will shrink slightly during autoclaving, which may lead to nozzle damage. Pre-sterilized Liquidator LTS tips are available from RAININ.**

## Recommendations for Pipetting

- Before operation allow the instrument to adjust to ambient conditions (temperature and humidity).
- Pre-rinse the tips - i.e. fill and empty 2-3 times with the same liquid - for better accuracy and precision.
- Proper pipetting speed depends on many factors, including the nature of the liquids being pipetted. The optimum operation speed for your sample will be discovered by usage.
- When pipetting small volumes (<10 µl) it is recommended to touch-off the tips against the receiving vessel or liquid surface whilst gently dispensing (by moving the plate holder very slightly forward).
- Alternatively, dispense the liquid above the destination plate such that it forms a droplet at the end of the tip. By slowly approaching the surface of a plate or the liquid in a plate these drops will be drawn from the tips when approaching to a close distance.
- Experienced users may also use the so-called "tip touch" technique from robotic systems:

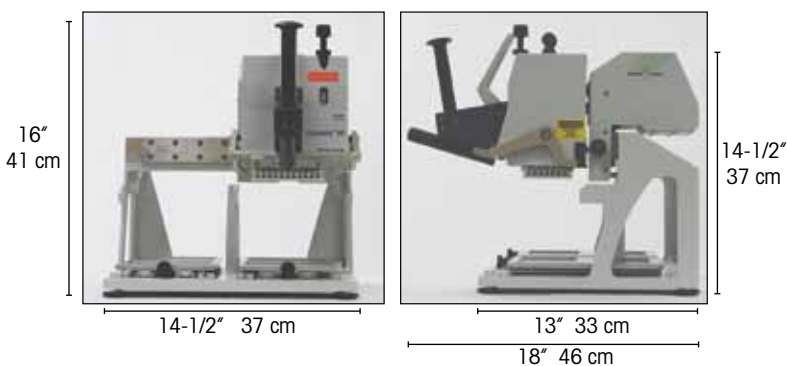
Carefully move the tray with the destination plate under the pipetting head so that the ends of the tips do not touch the center of the wells but instead the side walls. The liquid is then drawn from the tip by capillary action. The "tip touch" procedure has to be performed very carefully to avoid nozzle damage.

## Maintenance and Safety

When used according to the instructions in the manual, and with a little routine maintenance and regular cleaning, Liquidator 96 should provide years of trouble-free operation. Liquidator 96 surfaces can be cleaned with a soft cloth slightly moistened with water or a mild detergent.

It is important that the user does not try to dismantle the unit, as specified performance can only be guaranteed if the pipetting head is undisturbed from its factory setting.

## Dimensions



## Specifications

Inaccuracy (average over multiple full plates):

200  $\mu\text{L}$ :  $\pm 1.0\%$

100  $\mu\text{L}$ :  $\pm 1.0\%$

20  $\mu\text{L}$ :  $\pm 2.0\%$

5  $\mu\text{L}$ :  $\pm 5.0\%$

Precision:

200  $\mu\text{L}$ :  $\leq 0.5\%$

100  $\mu\text{L}$ :  $\leq 0.8\%$

20  $\mu\text{L}$ :  $\leq 1.5\%$

5  $\mu\text{L}$ :  $\leq 3.5\%$

## Ordering Information

Cat. No.	Description	Volume Range
LIQ-96-200	96-channel Manual Benchtop Pipetting System	1-200 µL

### Service Plans

LIQ-SVC	Annual Service Plan	
LIQ-SVC4	4-Year Service Plan	
LIQ-C-A	LIQ 96 CalPM Plan A	
LIQ-C-B	LIQ 96 CalPM Plan B	

### Accessories

LIQ-AP	Height adjustment posts	
LIQ-TRAY	Deep-well 8-section (longitudinal) reservoir	
LIQ-384PA	384-well adapter plate stage - white	
LIQ-384PA-B	384-well adapter plate stage -black	
LIQ-20PA	20 µl Tip adapter plate stage – white*	
LIQ-20PA-B	20 µl Tip adapter plate stage – black*	

### BioClean Liquidator Tips

#### Racked tips

LQR-200	Liquidator 96 Tips, Racked	5-200 µL
LQR-200S	Liquidator 96 Tips, Racked, Sterile	5-200 µL
LQR-200F	Liquidator 96 Tips, Filter, Racked	5-200 µL
LQR-20	Liquidator 96 Tips, Racked*	1-20 µL
LQR-20S	Liquidator 96 Tips, Racked, Sterile*	1-20 µL
LQR-20F	Liquidator 96 Tips, Filter, Racked*	1-20 µL

#### Stacked tips

LQS-200	Liquidator 96 Tips, Stacked	5-200 µL
LQS-200S	Liquidator 96 Tips, Stacked, Sterile	5-200 µL
LQS-20	Liquidator 96 Tips, Stacked*	1-20 µL
LQS-20S	Liquidator 96 Tips, Stacked, Sterile*	1-20 µL

\* The maximum volume that can be used with LQR-20x and LQS-20x tips is 20 µl.

If volumes greater than 20 µl are used, sample may be aspirated into the liquid head, resulting in damage to the liquid head, expensive repair, and voiding the warranty.

As these 20 µl tips are shorter than standard 200 µl tips, you are highly recommended to use a plate height adapter to raise the working plate up to the correct operational height for the tips.

## Limited Warranty and Limitation of Liability

a.) Seller warrants the merchandise to conform to specifications. Under no circumstances shall Seller be responsible for alleged nonconformities with respect to any merchandise which has been used for purposes or in any manner for which it was not intended, or any merchandise which has been customized or modified without Seller's prior written consent, or damaged or misused. As Buyer's exclusive remedy in the event of breach of warranty, Seller shall repair or replace, as its option, any nonconforming merchandise or parts thereof for a period of one (1) year after delivery. All claims must be made in writing to the Seller. Any claims not made within the period specified above shall be deemed waived and released.

b.) THE PROVISIONS OF THE FOREGOING WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL (INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE OR NON-INFRINGEMENT). SELLER'S LIABILITY ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF A PRODUCT OR ITS USE OR ITS DISPOSITION, WHETHER BASED UPON WARRANTY, CONTRACT, TORT OR OTHERWISE, SHALL NOT FOR ANY REASONS EXCEED THE AGGREGATE PURCHASE PRICE PAID BY BUYER FOR SUCH PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS, LOSS OF DATA OR LOSS OF USE) ARISING OUT OF THE MANUFACTURE, SALE, SUPPLY, USE, MARKETING, RESALE OR OPERATION OF THE MERCHANDISE, EVEN IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR LOSSES.

## Appendix

### Using the 384-Well Adapter

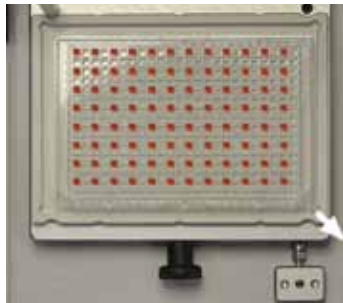
This adapter holds a 384 well plate and allows the plate to move into four discrete positions so that all 384 wells can be filled with four passes of a 96-place tip array. To access all the wells the 384-well plate is moved fully into each of the four corners of the adapter.

#### Operation:

1. Place the Adapter into the working position, and place the 384-well plate fully right and to the bottom as shown.



2. Aspirate sample, move the pipetting head over the 384-well plate, and dispense into 96 of the wells as shown here.



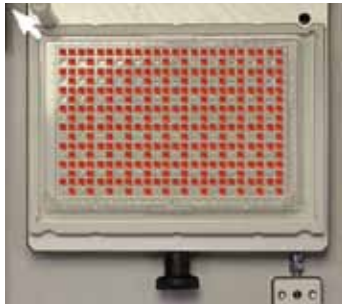
Well number A1  
(top left)  
is the first  
well filled

3. Move the 384-well plate fully left and to the bottom and aspirate the next samples. Move the pipetting head over the 384-well plate and dispense into the next 96 wells as shown.



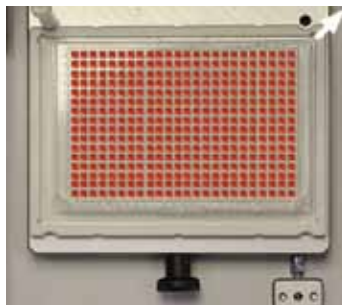
Well number A2  
is filled

4. Move the 384-well plate fully left and to the top and aspirate the next samples. Move the pipetting head over the 384-well plate and dispense into the next 96 wells as shown.



Well number B2  
is filled

5. Move the 384-well plate fully right and to the top and aspirate the next samples. Move the pipetting head over the 384-well plate and dispense into the remaining 96 wells as shown.



Well number B1  
is filled

## **Contacting RAININ**

Technical Information:

T: 800-543-4030 F: 510-564-1617 [tech.support@rainin.com](mailto:tech.support@rainin.com)

Pipette Service

T: 800-662-7027 F: 781-935-7631 [service@rainin.com](mailto:service@rainin.com)

Direct Order Line:

T: 800-472-4646 F: 510-564-1617 [pipets@rainin.com](mailto:pipets@rainin.com)

[www.rainin.com](http://www.rainin.com)

From outside North America:

T: +1-510-564-1600

[global@rainin.com](mailto:global@rainin.com) (from outside the U.S.)

[www.mt.com/rainin](http://www.mt.com/rainin)

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