

# Pipetman<sup>®</sup> Ultra

continuously adjustable  
digital microliter pipettes

8 pipettes for  
volume ranges from  
0.1  $\mu$ L to 10 mL

**U-2**

**U-10**

**U-20**

**U-100**

**U-200**

**U-1000**

**U-5000**

**U-10ML**

Pipetman Ultra U-200 shown



***RAININ***

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## Pipetman Ultra Features

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Parallax-free electronic display for easy volume setting  
Flashing indicators if volume set is out of range  
Ergonomic design, maximum comfort for left or right-handed use  
Light, balanced, low ejection force  
Simple to maintain and calibrate  
GLP cycle counters

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## Parts Check List

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The following items should be included.

- Pipetman Ultra    User's Guide
- Calibration Tool    Tube of lubricant (except U-2 & U-10)
- Name-tags (5 different colors)
- Certificate of conformity (including bar-code sticker).

If any item is missing, call 800-543-4030

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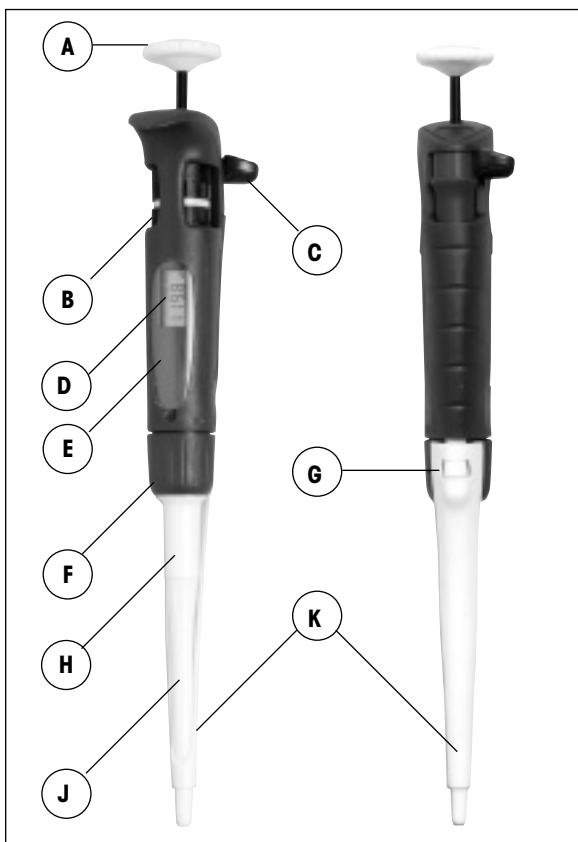
## Technical Assistance: 800-543-4030

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Call this toll free number for technical consultation and product information for Pipetman, RAININ pipettes, and disposable tips. Or use e-mail: [tech.support@rainin.com](mailto:tech.support@rainin.com)

## Description

- A Push-button for switching on, setting the volume, aspirating, and dispensing. (Button is color coded with the volume range printed on the top.)
- B Thumbwheel, to set and lock the volume.
- C Tip-ejector button, can be positioned for left or right-handed operation.
- D Liquid Crystal Display (LCD) window for volume-setting and status indicators.
- E Identity-tag window (see GLP features).
- F Shaft Coupling for upper part of removable shaft (contains piston) .
- G Tip-ejector stroke adjustment-wheel.
- H,J Upper (H) and lower (J) parts of shaft, both removable for cleaning and/or autoclaving.
- K Tip ejector.



## Autoclaving

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The upper and lower parts of the shaft, and the tip ejector (also the tip ejector extensions for Pipetman Ultra models U-2 & U-10), are autoclavable: 121°C, 1 bar, 15–20 minutes.

## Operating Ranges

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Model	Range	Color Code
U-2	0.1 - 2 $\mu$ L	Orange
U-10	0.5 - 10 $\mu$ L	Red
U-20	2 - 20 $\mu$ L	Clear yellow
U-100	10 - 100 $\mu$ L	Peach
U-200	20 - 200 $\mu$ L	Yellow
U-1000	100 - 1000 $\mu$ L	Blue
U-5000	500 - 5000 $\mu$ L	Purple
U-10ML	1 - 10 mL	Clear blue



## Switching On

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Press the push-button to the first stop to switch on the pipette. The information displayed in the LCD window depends on the status of the pipette and the volume currently set (see below).

 Pipetman Ultra turns itself off after 3 min of inactivity - just press the push-button (or unlock) to reactivate the pipette.

## Volume Indicator - LCD Window

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### What you normally see ...

- 1) Volume setting.
- 2) Units (mL or  $\mu$ L).
- 3) Volume status (LOCKED or UNLOCKED).


### What could appear ...

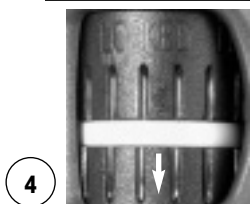
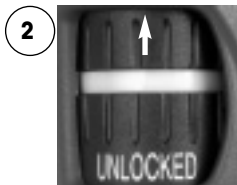
- 4) Calibration status: 'RECAL' this means that your pipette has been recalibrated.
- 5) Battery status: failing - 'LOW BATT' here, or failed - 'BATT' in place of volume setting. (The battery is factory installed. It has a lifetime of four years under normal use.)

- 6) Cycle counters: You will see the counters at the right-hand side of an otherwise blank screen.
- Since the last volume setting - holding down the push-button for 7 seconds displays this information (maximum 199); for example 126 cycles. 
  - Since the pipette was made - holding down the push-button for 10 seconds displays this information (maximum 999999); in this example 285396 cycles. 
- 7) Refer to "Troubleshooting" for possible error messages.

## Setting the Volume

- Switch on: press the push-button to the first stop. LCD shows the volume currently set.
- Unlock: push the thumbwheel upwards. LCD shows UNLOCKED (also visible on the thumbwheel).
- Rotate the thumbwheel or the push-button to set volume (clockwise to decrease, counterclockwise to increase).
  - when **decreasing** the volume, reach the required setting slowly, making sure not to overshoot the mark.
  - when **increasing** the volume, pass the required value by 1/3 of a turn, then decrease the volume slowly, making sure not to overshoot the mark.
- Lock the volume: push the thumbwheel downwards. LCD shows LOCKED.

 You are strongly advised to lock the volume, to avoid accidentally changing the setting when pipetting.



- To reduce battery consumption, lock the volume before storing Pipetman Ultra.
- The **units** indicator flashes if you set a volume below 90% of the minimum recommended range of the pipette. You can dispense an aspirated volume below the minimum recommended, but the specifications cannot be guaranteed.
- The **volume** indicator flashes if you try to set a volume above the maximum permitted range; you cannot pipette a volume that is greater than the maximum permitted range.

## Tip Selection

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- Tips must seal properly on the shaft to assure an air-tight seal and avoid leaks or poor accuracy.
- Tips must be soft and flexible so that the shaft is not scratched or worn prematurely.
- Tips must be free from microscopic flash and particulates. Flash gives poor precision and accuracy.
- The tip orifice must be the correct size, and orifice size and geometry must be consistent from tip to tip. Otherwise, accuracy and precision will be affected.
- Interior and exterior surfaces must be clear, smooth, and hydrophobic to avoid retention of liquid. Too much retention results in poor accuracy and reproducibility.

Specified performance is guaranteed only when RAININ disposable tips are used as recommended. RAININ cannot accept responsibility for poor performance resulting from the use of tips by other manufacturers. Tips are intended for single use only.

RAININ tips are molded from premium-grade virgin polypropylene plastic. Samples from each lot of tips are inspected microscopically to ensure that every lot meets RAININ's high standards.

Use RAININ aerosol-resistant tips to avoid any sample-to-sample, sample-to-pipette, or sample-to-operator contamination.

## Pipetting

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- 1) **Mount a tip:** Push the shaft into a new RAININ tip using a slight twisting motion to ensure a firm and airtight seal.
- 2) **Pre-rinse the tip:** Some liquids (e.g. protein-containing solutions and organic solvents) can leave a film of liquid on the inside wall of the tip; pre-rinse the tip to minimize any errors that may be related to this phenomenon. Pre-rinsing consists of aspirating the first volume of liquid and then dispensing it back into the same vessel (or to waste).

Subsequent pipetted volumes will have levels of accuracy and precision within specifications.

- 3) **Aspirate.** Press the push-button to the first stop (this corresponds to the set volume of liquid).

Hold the pipette vertically and immerse the tip in the liquid (see table for immersion depth).

Release the push-button slowly and smoothly (to top position) to aspirate the set volume of liquid.

Wait at least one second (time depends on model, see table), then withdraw the pipette-tip from the liquid.

You may wipe any droplets away from the outside of the tip using a medical wipe, **however if you do so take care to avoid touching the tip's orifice.**

- 4) **Dispense.** Place the end of the tip against the inside wall of the recipient vessel, at an angle no more than 20°.

Press the push-button slowly and smoothly to the **first stop**.

Wait for at least one second then press the push-button to the **second stop** to expel any residual liquid from the tip.

Keep the push-button pressed fully down and (while removing the pipette) draw the tip along the inside surface of the vessel.

Release the push-button, smoothly.

- 5) **Eject the tip.** Press firmly on the tip ejector button.

#### TOP POSITION



#### FIRST STOP



#### SECOND STOP



## Tip Immersion Depth

The recommended tip insertion depth and wait time for each Pipetman Ultra model is shown in the table below.

<u>Model</u>	<u>Volume Range</u>	<u>Immersion Depth</u>	<u>Wait Time</u>
U-2	0.1 - 2 $\mu$ L	1 - 2 mm	1 sec
U-10	0.5 - 10 $\mu$ L	1 - 2 mm	1 sec
U-20	2 - 20 $\mu$ L	2 - 3 mm	1 sec
U-100	10 - 100 $\mu$ L	2 - 3 mm	1 sec
U-200	20 - 200 $\mu$ L	2 - 4 mm	1 sec
U-1000	100 - 1000 $\mu$ L	2 - 4 mm	2 - 3 sec
U-5000	500 - 5000 $\mu$ L	3 - 6 mm	4 - 5 sec
U-10ML	1 mL - 10 mL	6 -10 mm	4 - 5 sec

Tip immersion depth is important. If exceeded, the volume measured will be inaccurate, possibly out of specification. Tip angle is also important. Hold the pipette vertically, or within 20 degrees of vertical.

## **Pipetting Guidelines & Precautions**

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Consistency in all aspects of pipetting procedure will significantly contribute to optimum reproducibility. Use a:

- Smooth, slow and consistent pickup / dispense.
- Consistent speed and smoothness when you press and release the pushbutton.
- Consistent pushbutton pressure at the first stop.
- Consistent immersion depth (see table on previous page).
- Minimal angle ( $< 20^\circ$  from vertical).

Prevent liquids from being drawn into the Pipetman Ultra shaft by taking the following precautions:

- Use RAININ aerosol-resistant tips, with an internal filter which acts as a barrier to aerosols and liquids.
- Never invert or lay Pipetman Ultra down if liquid is in the tip.
- Pipette slowly, holding Pipetman Ultra  $< 20^\circ$  from vertical.

### **General guidelines:**

- Use a new RAININ disposable tip for each sample.
- Pre-rinse each new tip with the sample to be pipetted.
- Do not pipette samples with temperatures above  $70^\circ\text{C}$  or below  $4^\circ\text{C}$ . Extreme temperatures can affect accuracy and precision.

Pipetman Ultra is a precision instrument and should be treated with the level of care appropriate for laboratory instrumentation. After use, store Pipetman Ultra in a clean, safe place: it is recommended to use pipette stands, Cat. Nos. GR-2 or GR-3.

## **Reverse Mode Pipetting**

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In reverse mode pipetting; the operating sequence is reversed:

1. Mount a disposable tip on the pipette shaft.
2. Press the pushbutton fully to the second stop.
3. Immerse the tip in liquid and return the plunger slowly to the full up position. Wait a moment for the liquid column to reach equilibrium in the tip.
4. Wipe any excess liquid from the outside of the tip without touching the orifice.
5. To dispense, rest the end of the tip against the vessel wall and press the plunger to the first stop. Hold this position a few seconds, or long enough for the liquid column to reach equilibrium again.



6. Remove the tip from the receiving vessel without blowing out the remaining liquid.
7. Return excess sample in the tip to the original sample container, if desired. Discard the used tip.

## **Pipetting Liquids of Varying Density**

Pipetman Ultra lets you compensate for solutions of density much different from water, by setting the volume slightly higher or lower than that required. The compensation amount must be determined empirically.

E.g., if pipetting 10  $\mu\text{L}$  of CsCl solution, you determine that the volume delivered is actually 8.5  $\mu\text{L}$  ( $\geq 5$  samples). Try changing the volume setting to 11.8  $\mu\text{L}$  and repeat the measurements. If the volumes delivered are still not close enough to 10  $\mu\text{L}$ , make another slight volume adjustment until the measurements are as desired.

Very dense liquids may not be suitable for air displacement pipetting. Use Microman® positive displacement pipettes instead.

For volatile solvents you should saturate the air-cushion of your pipette by aspirating and dispensing the solvent repeatedly before aspirating the sample.

## **Temperature Considerations**

Warm or cold liquids can be measured with good precision by using a consistent pipetting rhythm. This will help minimize any differences in heating or cooling effects within the pipette. Use a new tip each time for best accuracy and precision when measuring samples with temperatures greatly different from ambient, and do not pre-rinse. You will get best results if there is no delay between picking up the sample and dispensing it.

## **Acids and Corrosives**

After pipetting concentrated acids or highly corrosive solutions you should disassemble Pipetman Ultra and inspect and clean (if necessary) the piston, shaft, seals and o-rings.

Be sure to read "Removing the Piston" on page 13 before disassembling the Pipetman Ultra.

Extensive contact with corrosive fumes may corrode the piston. This will result in premature seal wear and may require refinishing or replacement of the piston. Exposure of internal components to corrosive fumes can be reduced by using aerosol-resistant tips. These tips have an internal filter which acts as an aerosol barrier.

## Personalizing your Pipette

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### Tip ejector

Before you start to pipette you can adjust the tip-ejector button according to your preferences.

- 1) Position the tip-ejector button. Simply rotate the tip-ejector button to the most comfortable position: left, right, or middle.

**TIP EJECTOR BUTTON**



**TIP EJECTOR BUTTON  
(set for right-handed user)**



The tip ejector is adjustable in height to allow for different types of tip, where (for example) the length of the collar is different.

- 2) Set the stroke by rotating the adjustment wheel until you find the position where it is most easy to activate the tip ejector.



**STROKE ADJUSTMENT WHEEL**

You may want to reset the stroke after fitting a different type of tip.

## Name Tag Label

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You can identify your pipette with a color-coded name-tag:

- 1) Pry out the window by inserting a small screwdriver in the access slot.
- 2) Position the name tag next to the LCD.
- 3) Clip the window back into place.



## Tip-ejector Extension

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### For use with Pipetman Ultra U-2 and U-10

In order to eject micro-volume tips, tip-ejector extensions are supplied with U-2 and U-10 pipettes. They may be already fitted to the shaft on your U-2 or U-10 model, but if they are not fitted, follow the instructions below.

The tip ejector extension (PVDF – polyvinylidene fluoride), can be autoclaved.

#### To fit the tip-ejector extension:

Hold the pipette with the LCD window uppermost,

Hold the extension with the slot uppermost,

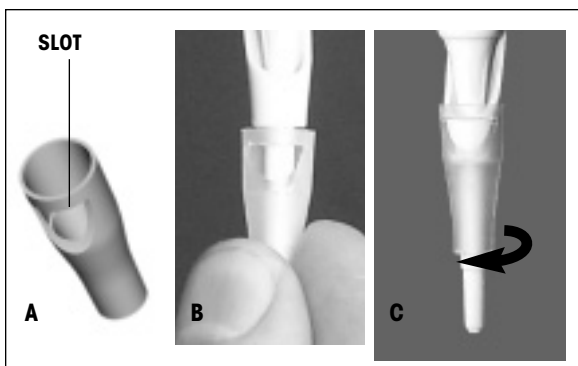
Slide the extension over the shaft,

Push the extension firmly onto the end of the tip ejector until it clicks into place. (See "B")

#### To remove the tip-ejector extension:

Hold the pipette in one hand and grip the extension with the other.

Gently twist the extension (either direction) and pull it away from the pipette. (See "C")



## Troubleshooting

You may be able to identify and to correct the problem by referring to the following table.

<b>Symptom</b>	<b>Possible Cause</b>	<b>Refer to page</b>
Pipette is leaking sample	Worn O-ring	13
Pipette won't aspirate	Worn O-ring	13
	Unscrewed lower part of shaft	12
	Damaged or corroded piston	13-15
	Damaged shaft	12
	Improper repair or assembly	13-15
	Shaft coupling is loose	13
Noisy operation	Piston needs lubricating	15
Pipette is inaccurate	Improper repair or assembly	13-15
	Unscrewed lower part of shaft	12
	Pipette is out of calibration	18-20
	Shaft coupling is loose	13
Pipette is not precise	Unscrewed lower part of shaft	12
	Volume setting not locked	3
	Incorrect operator technique	-
	Worn O-ring	13
	Shaft coupling is loose	13
	Damaged or corroded piston	13-15
	Damaged shaft	12
Tips fall off or don't fit	Low quality tips	4
	Damaged shaft	12
	Damaged tip ejector	11
No LCD display	Pipette is not switched on	1
	Battery has failed	15



**PIPETMAN ULTRA MUST BE IN THE LOCKED POSITION TO CHANGE THE BATTERY, OTHERWISE THE PIPETTE WILL NEED RECALIBRATION.**

**Before returning any pipette, ensure that it is completely free of chemical, biological, or radioactive contamination. Call Tech. Support, 800-543-4030.**

## Error Messages

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Contact RAININ at 800-543-4030 if you see any of these error messages on the display:

Message	Cause
ERR1	Battery changed when the pipette was in the UNLOCKED position.  Volume not set to the correct calibration volume when the calibration tool was plugged in (see "Recalibration").
ERR2	Setting problems.
ERR3	Electronic problems (microchip).

☞ If you see "RECAL" flashing in the top right of the LCD, you must recalibrate the pipette. After user recalibration you will see "RECAL" steady on the LCD (not flashing).

To remove "RECAL" and set Pipetman Ultra to original calibration, return it to RAININ Service (see p. 20) for factory calibration.

If "RECAL" does not appear, there may be a problem with the instrument. Contact RAININ Tech Support at 800-543-4030.

## Maintenance

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You may safely perform the following tasks:

Clean or autoclave parts listed in "Cleaning & Decontamination",

Replace the parts specified under "Spare Parts",

Lubricate the piston,

Change the battery, (lock the volume before removing battery)

Recalibrate the pipette. (You are recommended to use RAININ for calibration.)

### Shaft and Tip ejector

The shaft and tip ejector must be changed if they are accidentally damaged or attacked chemically. You should also remove these parts for cleaning or decontamination purposes.

### Changing the Tip-ejector

- 1) Keep the tip-ejector button depressed and grip the top of the tip ejector with the other hand.



- 2) Gently rotate the tip ejector counterclockwise and separate its connector from the activating rod.

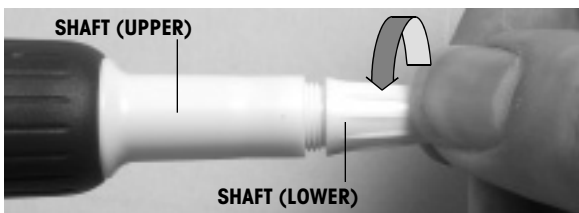


- 3) Pull the tip ejector away from the body of the pipette.
- 4) Clean or autoclave the tip ejector and refit it (or a new one) by reversing the procedure.

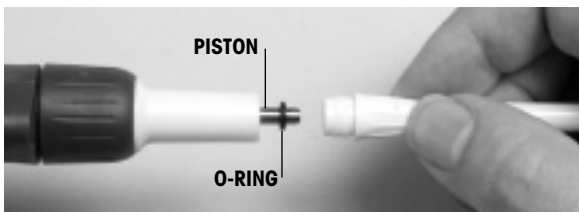
### Changing the Shaft (lower part)

After removing the tip ejector, you may remove the lower part of the shaft, which is more likely to become contaminated or damaged than the upper part. Removal of the lower part is shown below; for the upper part see "Removing the Piston" (special precautions are necessary).

- 1) Gently rotate the lower part of the shaft counterclockwise to unscrew it from the upper part.



- 2) Separate the parts and remove the O-ring (see "Changing the O-ring").
- 3) Clean and if required autoclave the lower part of the shaft.
- 4) If required lubricate the piston (see "How to Lubricate the Piston") and fit a new O-ring.
- 5) Screw the two parts together by hand, making sure that the two parts are fully tightened.



- 6) Refit the tip ejector.

## Changing the o-ring

The o-ring is contained by the two halves of the shaft; it must not be autoclaved, if worn or damaged in any way, it must be replaced.

To access the o-ring, remove the tip ejector and unscrew the lower part of the shaft - if the o-ring is not immediately visible on the piston, set the pipette to its maximum volume, then press the push-button to the second stop. You should now be able to remove the O-ring from the piston. Sometimes, the o-ring may be found in the recess at the top end of the lower part of the shaft.

If required lubricate the piston (see "How to Lubricate the Piston") then fit a new o-ring by sliding it onto the piston. Reassemble the pipette.

The dimensions of the o-ring vary according to the pipette model - refer to "Spare Parts" for details.

## Servicing the Piston

You may remove the piston assembly to clean, lubricate, or change the piston.



**The pipette must be recalibrated after removing and replacing the piston.**

## Removing the Piston

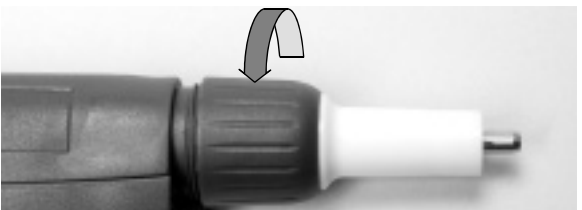
1) Set the volume to zero and lock the pipette.

**DO NOT UNLOCK THE PIPETTE OR TRY TO RESET THE VOLUME WHILE CHANGING THE PISTON ASSEMBLY, OTHERWISE DAMAGE MAY OCCUR TO INTERNAL COMPONENTS.**

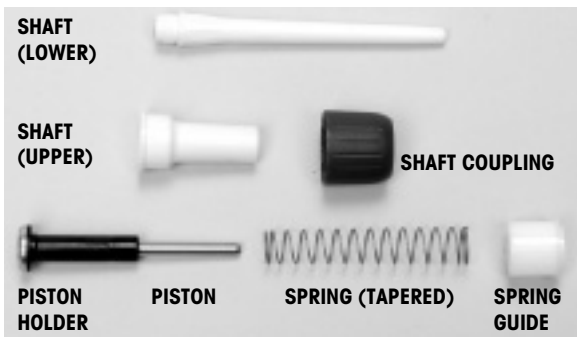
2) Remove the tip ejector and (optionally) the lower part of the shaft.

If you remove the lower part, take care to remove the o-ring as described in "Changing the o-ring".

3) Unscrew the shaft coupling (turn by hand, counterclockwise).



4) Pull on the spring guide to remove the piston assembly from the body of the pipette - separate the parts (see next page).

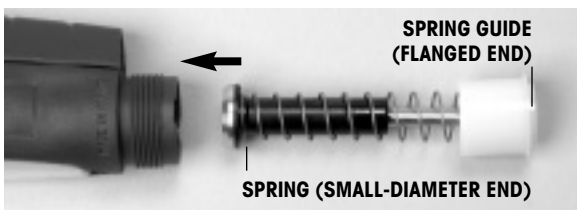


☞ For U-5000 and U-10ML the shaft coupling and the upper part of the shaft are combined (see "Spare Parts").

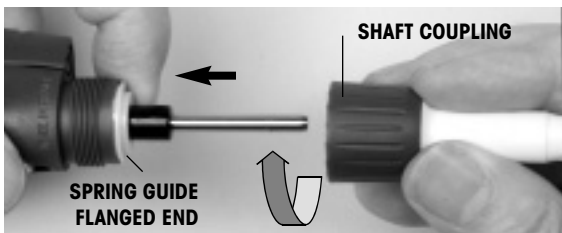
- 5) Clean and autoclave (if required) the piston and holder, together with any other parts that may need to be treated in the same way (see "Cleaning and Decontamination").
- 6) Lubricate the piston; see next page.
- 7) Reassemble the piston, spring and spring guide; then carefully insert the assembly into the body of the pipette. The spring guide should hold the piston assembly inside the body of the pipette.



Take care to position the small-diameter end of the spring as shown (innermost), and that the flanged end of the spring guide is outermost.



- 8) Reassemble the upper part of the shaft and the shaft coupling, then refit to the body of the pipette by rotating the shaft coupling clockwise until it is finger tight. Fit the o-ring (or for U-2 and U-10, the seal) and reassemble the lower part of the shaft. Refit the tip ejector.



The seals for U-2 and U-10 are fragile and can only be used once. So, after unscrewing the lower part of the shaft you must fit a new seal.



## How to Lubricate the Piston (except U-2 and U-10)

Use the proper lubricant (Cat. No. 70902, supplied). Squeeze a small quantity from the tube onto a clean, nonabrasive cloth. Use the cloth to transfer the lubricant to the piston. Ensure that the piston is evenly lubricated, and that you wipe away any excess - only a fine film of lubricant is required (over the entire piston).

## Changing the Battery



**PIPETMAN ULTRA MUST BE IN THE LOCKED POSITION TO CHANGE THE BATTERY, OTHERWISE THE PIPETTE WILL NEED RECALIBRATION.**

The battery is a silver-oxide plated 1.5V low-drain type, generic code 386 (size 11.6 x 4.2 mm).

Remember that locking your pipette when not in use will maximize the life of the battery. Battery life under normal use is 4 years. If you need to change it, proceed as follows:

- 1) **LOCK THE VOLUME.**
- 2) Remove the tip ejector.
- 3) Remove the battery compartment cover.
- 4) Pull out the battery holder (red plastic).
- 5) Lift up and remove the copper clip.
- 6) Lever-out the old battery and put it in a secure bin for recycling.
- 7) Insert a new battery (see "Spare Parts") into the battery holder.

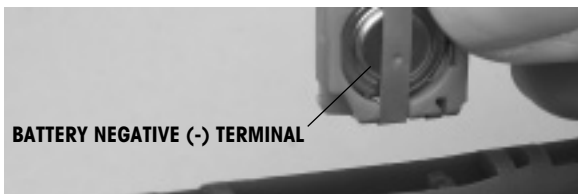
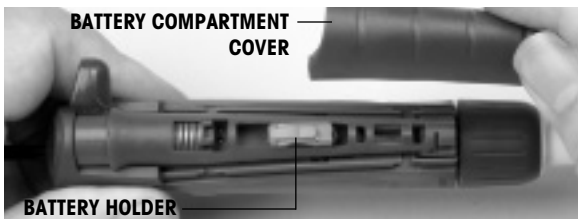


**LIFT & REMOVE**



Take care that the negative terminal of the battery is uppermost (i.e. facing you).

- 8) Refit the copper clip.
- 9) Refit the battery compartment cover.



## **Cleaning and Decontamination**

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Pipetman Ultra is designed so that the parts normally in contact with liquid contaminants can easily be cleaned and decontaminated.



**Liquid must not enter the body (handle) of the pipette.**

If you use chemical solutions for decontamination or detergents for cleaning, other than specified below, you should check with your supplier that the solution or detergent used does not attack any of the following materials: stainless steel, POM (Polyoxymethylene), PVDF (Polyvinylidene Fluoride) and PC (Polycarbonate).

### **Cleaning**

The pipette must be cleaned, as described below, before it is decontaminated. Soap solution is recommended for cleaning Pipetman Ultra.

#### **External**

- 1) Remove the tip ejector (see "Changing the Tip-ejector").
- 2) Wipe the tip ejector with a soft-cloth or lint-free tissue impregnated with soap solution.
- 3) Wipe the entire pipette with a soft-cloth or lint-free tissue impregnated with soap solution, to remove all dirty marks. If the pipette is very dirty, a brush with soft plastic bristles may be used.
- 4) Wipe the entire pipette and the tip ejector with a soft cloth or lint-free tissue impregnated with distilled water.

#### **Internal**

The following components **ONLY** can be immersed in a cleaning solution: tip ejector, shaft (both parts), shaft coupling, piston (including holder), return spring, and spring guide.

- 1) Disassemble the pipette as described in "Maintenance".
- 2) Set aside the upper part in a dry and secure location.
- 3) Clean the individual components of the lower part of the pipette using an ultrasonic bath (20 minutes at 50°C) or with a soft-cloth and brushes. Small round brushes with soft plastic bristles may be used to clean the interior of the shaft.
- 4) Rinse the individual components with distilled water.
- 5) Leave the parts to dry by evaporation or wipe them with a clean soft-cloth or lint-free tissue.
- 6) Lubricate the piston and reassemble the pipette according to the instructions given earlier in this chapter.

## **Decontamination**

### **Autoclaving**

**The body (handle) of the pipette is not autoclavable.** Only the following parts may be autoclaved: tip ejector, shaft (both parts), shaft coupling, piston (including holder), return spring and spring guide. **The O-ring is not autoclavable;** it should be replaced as specified in "Spare Parts".

- 1) Clean the parts to be autoclaved, especially the shaft.
- 2) Put the parts in an autoclaving sack.
- 3) Autoclave for 20 minutes at 121°C at 1 bar.
- 4) Check that the parts are dry before re-assembling the pipette.
- 5) Set the pipette aside to stabilize at room temperature.

### **Chemical Decontamination**

You may choose to decontaminate your pipette chemically, in accordance with your own procedures. Whatever decontaminant you use, check that it is compatible with the plastics used in the construction of the pipette: stainless steel, POM (Polyoxymethylene), PVDF (Polyvinylidene Fluoride) and PC (Polycarbonate).

### **Non-immersible Parts**

- 1) Wipe the body (handle) of the pipette with a soft-cloth or lint-free tissue wetted with the chosen decontaminant.
- 2) Wipe the body of the pipette with a soft-cloth or lint-free tissue wetted with distilled water or sterile water.

### **Immersible Parts**

The following components only can be immersed in a decontaminant solution: tip ejector, shaft (both parts), shaft coupling, piston (including holder), return spring, and spring guide.

- 1) Disassemble the pipette as described in "Maintenance".
- 2) Immerse the components in the de-contaminant solution or wipe them according the instructions given by the manufacturer or supplier of the decontaminant.
- 3) Rinse the individual components with distilled or sterile water.
- 4) Leave the parts to dry by evaporation or wipe them with a clean lint-free tissue or soft-cloth.
- 5) Lubricate the piston and reassemble the pipette according to the instructions given earlier in this chapter.

## **Leak Test**

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After servicing or repair and before calibration, you are advised to perform a leak test, as follows.

- 1) Mount a new RAININ tip.
- 2) Set the pipette to the maximum volume (in the specifications), or use the maximum reference mark on the tip.
- 3) Pre-rinse the tip, then aspirate the set volume from a beaker of distilled water.
- 4) Maintain the pipette in the vertical position and wait for 20 seconds.
- 5) If a water droplet appears at the end of the tip there is a leak (see "Troubleshooting").
- 6) If you see no droplet, re-immerses the tip below the surface of water.
- 7) The water level inside the tip should remain constant; if the level goes down there is a leak (see "Troubleshooting").

## **Recalibration (user Adjustment)**

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The following procedure is primarily used to check the accuracy of a pipette following servicing (for example, after replacing the piston assembly). Recalibration must be carried out by trained people, under the conditions and using the equipment described in the free publication "AB-15: Procedure for Evaluating Accuracy and Precision of Gilson Pipettes". For a downloadable copy of AB-15 see RAININ's website: [www.rainin.com/pdf/ab15.pdf](http://www.rainin.com/pdf/ab15.pdf).

For more details call RAININ Technical Support at 800-543-4030. The Tech. Support group can help you to implement these pipette checking procedures or to build up your own procedures.

User should establish a routine for testing their pipettes at regular intervals, taking into account the following factors: frequency of use (see cycle counters), the nature and accuracy requirements of the liquids being pipetted, the number of operators using the pipette, and the number of cycles performed each time the pipette is used.

Because Pipetman Ultra is designed with GLP in mind, you can view the cycle counters each time you switch on the pipette.

## Procedure

Take 10 measurements, using distilled water, at the specified recalibration volume (see below). Use a balance, which must be more accurate than the pipette, to calculate the mean of the 10 measurements.

Model	Recalibration Volume ( $\mu\text{L}$ )	Balance sensitivity (g)
U-2	0.5	$10^{-7}$
U-10	1	$10^{-6}$
U-20	2	$10^{-6}$
U-100	20	$10^{-5}$
U-200	50	$10^{-5}$
U-1000	200	$10^{-4}$
U-5000	1000	$10^{-4}$
U-10ML	1000	$10^{-4}$

For example, for Ultra U-200 the recalibration volume is 50  $\mu\text{L}$ . You set the LCD to show 50  $\mu\text{L}$ , but you calculate a mean volume of 48  $\mu\text{L}$ ; a mean error of -2  $\mu\text{L}$ . Reset the pipette to show: Recalibration Volume minus Mean Error, in this example  $50 - (-2) = 52 \mu\text{L}$ .

Open the battery compartment, and plug in the calibration tool (as shown) to reset the displayed volume to 50  $\mu\text{L}$ .

- ☞ The LCD will show RECAL in the volume setting window. This indicates that the factory calibration has been modified. To remove the RECAL sign and obtain a "factory" calibration, return the pipette to RAININ.



Remove the calibration tool, close the battery compartment, and calculate the accuracy as described in the free publication "AB-15: Procedure for Evaluating Accuracy and Precision of Gilson Pipettes", which is a more exhaustive gravimetric test for determining accuracy and precision. Both are fully described in the document referenced above. Call 800-543-4030 for a free copy, or download from the web: [www.rainin.com/pdf/ab15.pdf](http://www.rainin.com/pdf/ab15.pdf)

### Note:

**If you do not wish to perform your own calibration, RAININ has a variety of service programs available, including Calibration PM (Preventive Maintenance). Call 800-543-4030 or visit the website for more information: [www.rainin.com/service.asp](http://www.rainin.com/service.asp)**

## **Service, Calibration and Repair**

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RAININ maintains its own Pipette Repair and Calibration facilities in the following locations:

RAININ Service Center

Rainin Road, Woburn, MA 01801, USA

Tel: 800-662-7027 Fax: 781-935-7631

RAININ Service Center

7500 Edgewater Drive, Oakland, CA 94621

Tel: 800-662-7027

Replacement parts are manufactured by Gilson and Rainin. It is recommended to use only these replacement parts, which are available in the U.S. only from Rainin.

It is NOT necessary to recalibrate the pipette after changing the seal or shaft.

Recalibration of the pipette is only necessary when the piston is replaced, and should only be done by qualified factory-trained personnel in the appropriate facility.

## **GLP Features**

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These are as follows:

- Locked volume.
- Serial Number is engraved on the body of the pipette and encoded in the bar-code.
- Bar Code: on the box and with the certificate (can be transferred).
- Name Tag (Application or User).
- Cycle counters:

from last volume setting (counts the number of cycles in the current 'run').

from manufacture (counts the total number of cycles for servicing purposes).

- Flashing display when volume set is out of specifications.
- "RECAL" indicator when pipette has been recalibrated.

## Specifications

Each Pipetman Ultra is factory calibrated and carefully checked gravimetrically before shipment using distilled water and an analytical balance. Water temperature and ambient conditions are stabilized at  $21.5^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . Volumetric corrections are made for both the density of water and evaporation where applicable. Consult the free RAININ publication "Procedure for Evaluating Pipette Accuracy and Precision" (AB-15) for further information. You can also download a copy of this publication from the RAININ website: [www.rainin.com/pdf/ab15.pdf](http://www.rainin.com/pdf/ab15.pdf)

These manufacturer's specifications should be used as guidelines when establishing your own performance specification. When used in accordance with the pipetting procedures in this manual and with RAININ tips, Pipetman Ultra pipettes will perform to the following specifications.

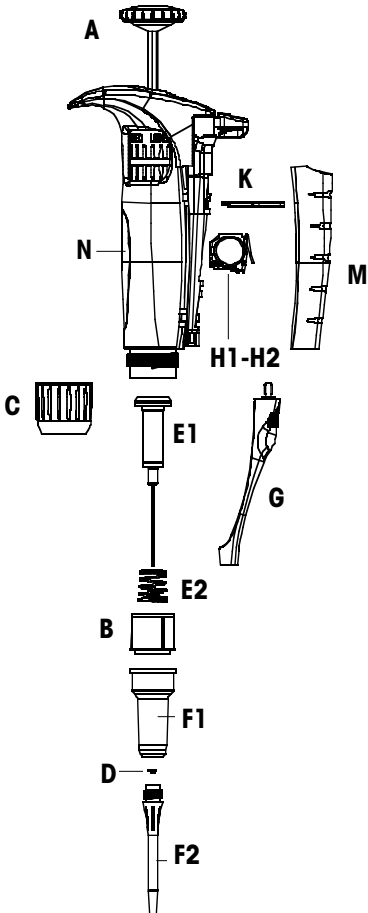
Specifications						
Model	Volume $\mu\text{L}$	Increment $\mu\text{L}$	Accuracy		Precision	
			%	$\mu\text{L} (\pm)$	%	$\mu\text{L} (\leq)$
2 $\mu\text{L}$	0.2	0.002	12.0	0.024	6.0	0.012
	1.0		2.7	0.027	1.3	0.013
	2.0		1.5	0.030	0.7	0.014
10 $\mu\text{L}$	1.0	0.02	2.5	0.025	1.2	0.012
	5.0		1.5	0.075	0.6	0.03
	10.0		1.0	0.1	0.4	0.04
20 $\mu\text{L}$	2	0.02	7.5	0.15	2.0	0.04
	10		1.5	0.15	0.5	0.05
	20		1.0	0.2	0.3	0.06
100 $\mu\text{L}$	10	0.2	3.5	0.35	1.0	0.10
	50		0.8	0.4	0.24	0.12
	100		0.8	0.8	0.15	0.15
200 $\mu\text{L}$	20	0.2	2.5	0.5	1.25	0.25
	100		0.8	0.8	0.25	0.25
	200		0.8	1.6	0.15	0.30
1000 $\mu\text{L}$	100	2	3.0	3.0	0.6	0.6
	500		0.8	4.0	0.2	1.0
	1000		0.8	8.0	0.15	1.5
5000 $\mu\text{L}$	500	5	2.4	12.0	0.6	3.0
	2500		0.6	15.0	0.2	5.0
	5000		0.6	30.0	0.16	8.0
10 mL	1 mL	20	5.0	50.0	0.6	6.0
	5 mL		1.0	50.0	0.2	10.0
	10 mL		0.8	80.0	0.16	16.0

Specifications are subject to change without notice.

# Replacement Parts (Manufactured by Gilson.)

## U-2 and U-10

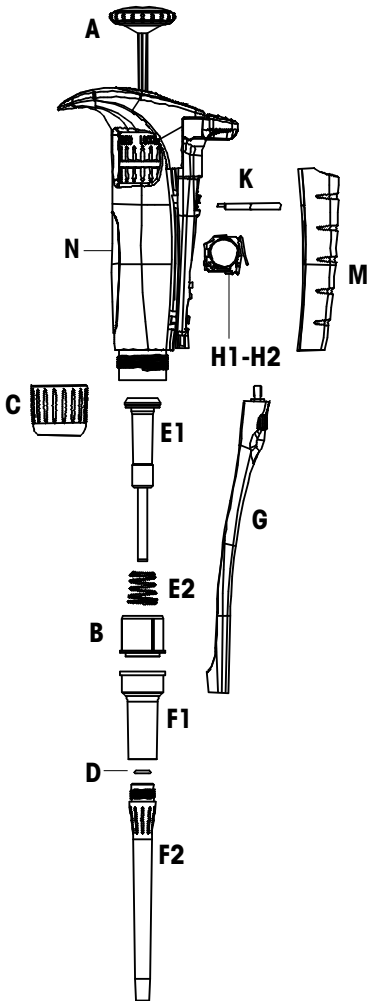
	Description	U-2	U-10
A	Push-button	70152	70252
B	Spring-guide	70103	70103
C	Shaft coupling	70111	70111
D	Seal	61901	61902
E1	Piston assembly	70160	70260
E2	Return spring	70113	70113
F1	Shaft (upper)	70117	70117
F2	Shaft(lower)	70118	70218
G	Tip ejector	70159	70159
H1	Battery Holder	70158	70158
H2	Battery	20710	20710
K	Recalibration Tool	20751	20751
M	Cover battery compartment	70107	70107
N	Plastic Window	70102	70102
-	Tip-ejector extension	70903	70903





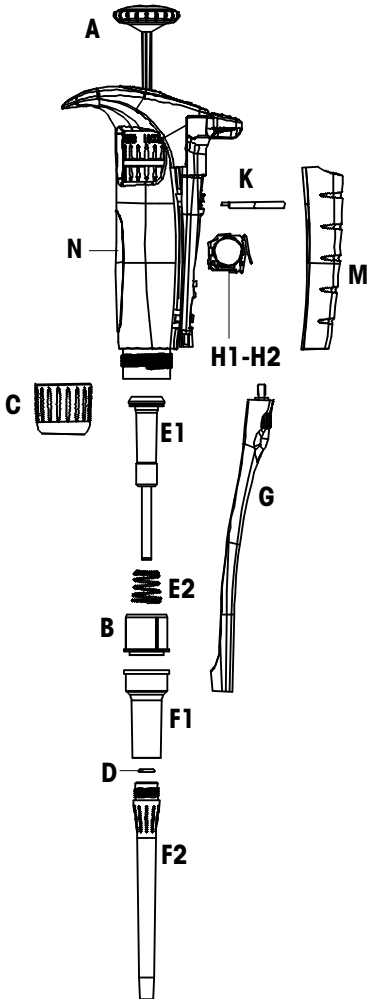
## U-20 and U-100

	Description	U-20	U-100
A	Push-button	70352	70452
B	Spring-guide	70103	70103
C	Shaft coupling	70111	70111
D	O-ring	61903	70401
E1	Piston assembly	70360	70460
E2	Return spring	70113	70113
F1	Shaft (upper)	70117	70417
F2	Shaft (lower)	70318	70418
G	Tip ejector	70359	70459
H1	Battery Holder	70158	70158
H2	Battery	20710	20710
K	Recalibration Tool	20751	20751
L	Lubricant	70902	70902
M	Cover battery compartment	70107	70107
N	Plastic Window	70102	70102



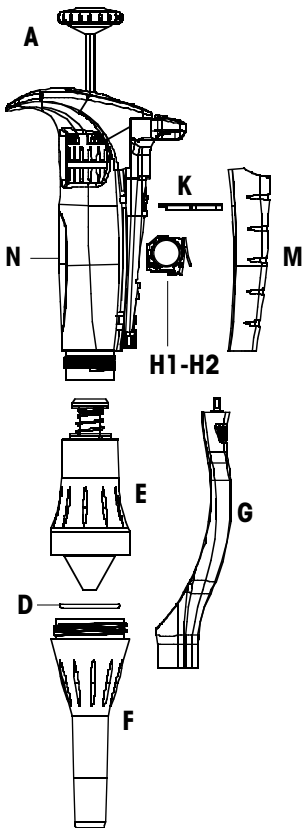
## U-200 and U-1000

	Description	U-200	U-1000
A	Push-button	70552	70652
B	Spring-guide	70103	70103
C	Shaft coupling	70111	70111
D	O-ring	70501	70601
E1	Piston assembly	70560	70660
E2	Return spring	70113	70113
F1	Shaft (upper)	70517	70617
F2	Shaft (lower)	70518	70618
G	Tip ejector	70559	70659
H1	Battery Holder	70158	70158
H2	Battery	20710	20710
K	Recalibration Tool	20751	20751
L	Lubricant	70902	70902
M	Cover battery compartment	70107	70107
N	Plastic Window	70102	70102



## U-5000 and U-10ML

	Description	U-5000	U-10ML
A	Push-button	70752	70852
D	O-ring	70701	70801
E	Piston assembly	70760	70860
F	Shaft	70718	70818
G	Tip ejector	70759	70859
H1	Battery Holder	70158	70158
H2	Battery	20710	20710
K	Recalibration Tool	20751	20751
L	Lubricant	70902	70902
M	Cover battery compartment	70107	70107
N	Plastic Window	70102	70102



## Limited Warranty

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See the enclosed Limited Warranty and Limitations of Liability Statement.

Please complete and return the Warranty Registration Card on receipt of your pipette.

## Contacting RAININ

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### Technical Information:

Phone: 800-543-4030  
Fax: 781-938-1152  
Email: [tech.support@rainin.com](mailto:tech.support@rainin.com)

### Pipette Service:

Phone: 800-662-7027  
Fax: 781-935-7631  
Email: [service@rainin.com](mailto:service@rainin.com)

### Direct Order Line:

Phone: 800-4-RAININ (800-472-4646)  
Fax: 781-938-1152  
Email: [pipets@rainin.com](mailto:pipets@rainin.com)

Web: <http://www.rainin.com>

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