RAININ
Pipetting 360°

Operating Instructions

Pipet-Lite™ PL™

Manual Pipettes

Single-channel

Multichannel

METTLER TOLEDO

Pipet-Lite PL
Manual Pipettes

- **Single channel models with LTS or universal-fit shafts for use with LTS or UNV tips**
- **Multichannel models with LTS**

Table of Contents

Contents of box

- Pipette model as ordered
- Warranty Card
- Grease (only for 5000 µL and 10 mL models)
- Filter (only for 5000 µL and 10 mL models)

If any item is missing, please contact your local MT office or distributor.

1. Pipet-Lite PL Single Channel Pipette

1.1 Introduction

Rainin Pipet-Lite PL family is continually being upgraded with new features to further improve ergonomics while maintaining high accuracy and performance. The pipette is available in several versions, outlined below; this manual will describe all models.

Single-channel
8 models for volumes from 0.1 µL to 10 mL

Multichannel
5 models for volumes from 1 µL to 1200 µL, in two formats: 8 and 12 channels

New enhancements for Pipet-Lite PL single channel include low stiction (static friction) seals for incredibly smooth operation.

In models with LTS™ shafts, the patented LTS LiteTouch™ Tip Ejection System reduces tip ejection forces by up to 85% in the single-channel LTS models.

Figure 1: Pipet-Lite PL, single-channel model

1.2 Setting Volume

1. Turn the volume lock lever to the "unlock" position so the volume setting mechanism is unlocked and free to turn. See left image in Figure 2.

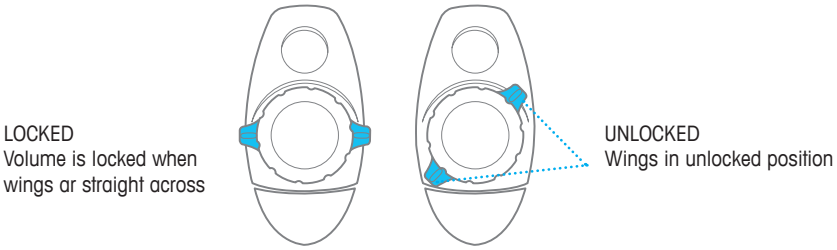


Figure 2: Volume Lock Control

2. With the mechanism unlocked, orient the pipette so you are looking at the volume indicator, then rotate the plunger button to change volume – counter-clockwise to increase, and clockwise to decrease volume.

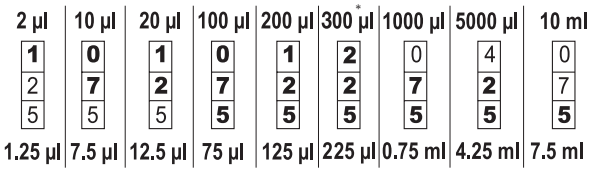


Figure 3: Volume Indicator by Pipette Model

Read the volume indicator from the top down:

2–20 µL: Black digits indicates µL. Red digits – tenths, hundredths of µL.
100, 200, 300* µL: All digits black – µL.
1000–5000 µL: red digit – mL. Black digits– tenths, hundedths of mL.
10 mL: Red digit – mL. Black digits – tenths of mL.

* 300 µL models are available in multichannel format only.

3. To eliminate errors due to mechanical backlash: when setting the desired volume, first turn the knob 1⁄3 turn above the desired volume. Then turn the knob slowly clockwise until the desired volume is displayed. Always dial down to the desired volume.

4. Turn the volume lock to the "lock" position (Fig. 2 above) to prevent changes to the volume setting. Some volumes for the 200 µL model are shown in Figure 4.

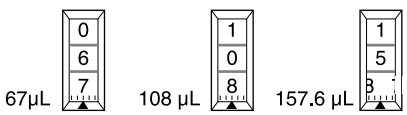


Figure 4: Example volumes

Volume ranges and increments for each single-channel model are shown below:

Single-Channel

Volume	Adjustable Range µL	Recommended Range µL	Increment µL
2 µL	0 to 2	0.1 to 2	0.002
10 µL	0 to 10	0.5 to 10	0.02
20 µL	0 to 20	2 to 20	0.02
100 µL	0 to 100	10 to 100	0.2
200 µL	0 to 200	20 to 200	0.2
1000 µL	0 to 1000	100 to 1000	2.0
5000 µL	0 to 5000	500 to 5000	5.0
10 mL	0 to 10 mL	1 mL to 10 mL	20.0

Filter

The 5000 µL and 10 mL pipettes use a filter in the end of the shaft to help prevent liquid entering the shaft and contaminating the piston, should the plunger snap up during aspiration. Using a filter is recommended when pipetting large volumes. Replace the filter if it gets wet.

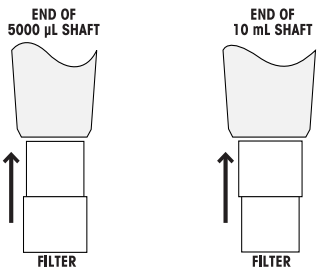


Figure 5: Filter orientation

The 5000 µL and 10 mL pipettes use the same filter, as shown in the diagram above:
5000 µL: small diameter into the shaft.
10 mL: large diameter into the shaft.

Filter part numbers are: 17001944 (pack of 100) and
17001945 (pack of 1000).

1.3 Tip Selection and Mounting

Rainin pipettes and tips are designed together as a pipetting system, both in LTS and traditional versions. All Rainin tips are BioClean and totally inert, so you can be assured of the best pipetting results.

Rainin pipettes are calibrated with Rainin tips, and performance to published specifications can only be guaranteed when Rainin tips are used.

To mount a tip, press the pipette shaft into the end of the tip with light force. With both LTS and traditional versions, the tip will seal properly on the shaft with minimal force — do not use more force than is required.

1.4 Tip Immersion Depth

The recommended depth for tip insertion into the sample for each model is shown below.

Nominal Volume	Volume Range	Immersion Depth
2 µL	0.1 - 2 µL	1-2 mm
10 µL	0.5 - 10 µL	1-2 mm
20 µL	2 - 20 µL	2 - 3 mm
100 µL	10 - 100 µL	2 - 3 mm
200 µL	20 - 200 µL	3 - 6 mm
1000 µL	100 - 1000 µL	3 - 6 mm
5000 µL	500 - 5000 µL	6 - 10 mm
10 mL	1 mL - 10 mL	6 - 10 mm

Tip immersion depth is critical and should not be exceeded, or the volume measured may be inaccurate, possibly out of specification. The tip angle is also important – the pipette should always be used in a position within 20 degrees of vertical. See Figure 6 below.

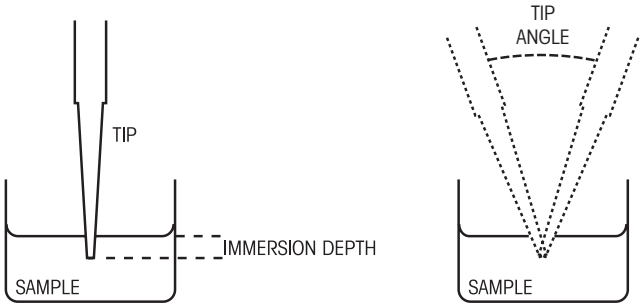


Figure 6: Tip Immersion Depth and Tip Angle

1.5 Operation

Before pipetting valuable samples, it is good to practice aspirating and dispensing water.

1. Set the desired volume as described in section 1.2.
2. Attach a new Rainin tip. Press the shaft into the tip with sufficient force to make a good seal.
3. Press the plunger button to the first stop, and hold it in this position. See the diagram below for a depiction of the first and second stops.

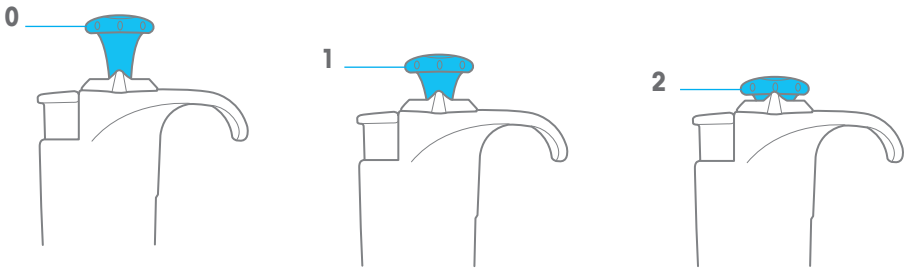


Figure 7: Neutral position (0), First stop (1), and Second stop (2)

Aspiration:

1. Holding the pipette vertically (or within 20° of vertical), place the tip into the sample to the proper depth and relax your thumb pressure on the plunger. The light piston spring will move the piston upward, aspirating sample. Do not let go of the plunger button, or the piston may snap up quickly, resulting in inaccurate measurement.
2. Pause for about 1 second (longer for macro-volume pipettes) to ensure that the full volume of sample is drawn into the tip.
3. Withdraw the tip from the sample. If any liquid remains on the outside of the tip, touch it off carefully onto a lint-free tissue, taking care not to touch the tip orifice.

Dispensing:

1. Touch the tip end against the side wall of the receiving vessel and press the plunger slowly, past the first stop, to the second stop, or blowout (bottom of stroke.)
   Wait: 1 second for 2-200 µL volumes, 1-2 seconds for 1000 µL and larger.
   (For viscous solutions pause before blowout.)
2. Still holding the plunger, withdraw the tip, sliding it along the wall of the vessel. Release the plunger.
3. Press the tip ejector button lightly to discard the tip. Use a new tip for each sample to prevent carry-over. Repeat for the next pipetting cycle.

Pipetting Guidelines

You should maintain:

1. Consistent pickup and dispense rhythm.
2. Consistent speed and smoothness when pipetting.
3. Consistent pressure on the plunger button at the first stop.
4. Consistent immersion depth. See Figure 6.
5. Pipette vertically, or within 20° of vertical.
6. Pre-rinse the tip twice by aspirating and dispensing sample before actual pickup.
7. Don't invert or lay the pipette flat with liquid in the tip.

More information on Good Pipetting Technique, including a Lab Poster, can be found on www.mt.com/gpp.

1.6 Tip Ejector Arm Removal

Four types of tip ejector are used and all types can be removed with minimum effort – do not use force.

For models up to 2000 µL
Metal tip ejector: press in the quick-release tabs on the ejector arm and pull the arm down.
Plastic tip ejector: grasp firmly on the ejector arm and pull down.

For 5000 µL & 10 mL models: grasp the top of the ejector arm and pull out then down.

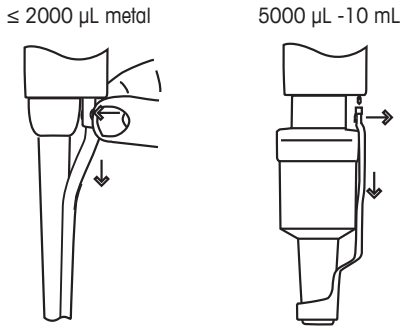


Figure 8: Removing Tip Ejector Arm

To replace the ejector arm, insert the shaft through the large opening, align the top of the ejector arm with the tip ejector push-rod, and push the ejector arm firmly until it is securely in place.

1.7 Storage

After use, store the pipette in a clean safe place. Four types of hangers are available to hold your pipette conveniently when not in use.

17001255: Free-standing carousel stand holds seven pipettes.
17003024: Set of three individual magnetic Hang-Ups™ for mounting on ferrous surfaces.
17004992: Three Hang-Ups attached to a clamp which fits onto a shelf

1.8 Care and Maintenance

Caution: When pipetting, never allow liquid to enter the shaft, where it may contaminate the piston and seal. When removing the shaft from the pipette body, make sure the spring, seal and seal retainer do not fall off the piston, especially the smaller models, as they may be difficult to find!

Your pipette is a sophisticated high precision lab instrument, and should be treated with appropriate care. The two biggest sources of damage occur with sample contamination inside the shaft, or with dropping the pipette. Filter tips and proper technique can mitigate the risk of sample contamination. Storing your pipette on appropriate hangers when not in use will reduce the chance of drops.

Sample contamination of the shaft, seals or piston can cause rough, sticky plunger movement. Eventually deposits on the piston can cause the seal to tear, leading to inaccurate results. Best practice for pipette maintenance is to regularly clean the pipette liquid end with the following procedure:

1. Remove tip ejector arm (See Tip ejector arm removal Figure 8).
2. On pipettes up to 1000 µL unscrew the shaft coupling nut and remove shaft.
   For pipettes >1000 µL unscrew the lower part of the shaft.
3. When you remove the piston assembly, note the order and placement of the seals, retainers, springs and o-rings on the piston assembly. Seals for models 100-1000 µL are asymmetrical and must be inserted in the correct orientation. Seals for models 2-20 µL are symmetrical and can be used in either orientation.
4. Seals for the 1000 µL model may remain inside the shaft when you remove the piston assembly; this is normal for this design. The seals may be removed from the shaft by inserting the large end of a tip into the shaft and hooking the seal over it.
5. To inspect and clean seals sized 100-200 µL, remove them gently from their retainers by pushing them out from the back side, preferably with a non-sharp object like a pipette tip.
6. Inspect the seals, retainers, o-rings, shaft and piston for contamination. Clean with a lint- free cloth with either distilled water or isopropyl alcohol. Apply grease (part number 17014531) sparingly by gently rubbing the seal or o-ring between the thumb and index finger, ideally using a clean powder-free examination glove. Apply a small amount of grease on the piston as well.
   Reassemble in the correct order and orientation.
7. If piston corrosion or staining is evident do not use the pipette and have a METTLER TOLEDO Service representative assist with replacement of the piston.
8. The shaft, tip ejector and handle may also be cleaned using a damp cloth with distilled water, 10% bleach solution, isopropyl alcohol, or any commercially available instrument decontamination solution. Be sure to rinse off the cleaning agent with distilled water.

1.9 Autoclaving

Autoclaving of your pipettes to perform sterilization may be performed at 121°C, at 1 Bar, for 15-20 minutes, with the following restrictions and guidelines.
Do not autoclave the entire pipette or any part not specifically identified in the table below.

Pipette line	Model Range	Autoclaveable parts
Pipet-Lite PL	2 - 2000 µL	Shaft, tip ejector, piston assembly, spring, seal, and seal retainer
Pipet-Lite PL	5000 µL, 10 mL	Shaft and tip ejector

The entire liquid end of Pipet-Lite PL single channel pipettes may be removed and placed into the autoclave without disassembling individual parts. The liquid end includes the following: shaft, tip ejector, piston assembly (with spring), seal and seal retainer.

If autoclaving more than one unit together, take care to reassemble your pipettes with all of their original parts. If you clean the piston and seals before autoclaving then be sure to re-grease them afterwards (see Care and Maintenance).
See Care and Maintenance and Replacement Parts sections for more details on disassembling pipettes.

1.10 Troubleshooting

Problem	Possible Cause	Suggested Remedy
Leaks, inaccuracy	Loose shaft	Tighten coupling nut by hand.
	Worn seal for pipette volumes ≤ 2000 µL	Replace seal
	Worn o-ring or insufficient grease seal for pipette volumes 5000 µL, 10mL, 20 mL	Replace o-ring and apply small amount of grease.
	Cracked or split shaft.	Replace shaft. Check piston is not bent. If bent, contact your Mettler-Toledo or Rainin Service Center (www.mt.com/contact) for a new piston.
Rough, jerky, or sticky plunger movement	Contamination inside mechanism.	Remove tip ejector arm, remove shaft and check piston and seal clean as described in Care and Maintenance section. If piston is permanently corroded or stained, contact your Mettler-Toledo or Rainin Service Center (www.mt.com/contact) for a new piston.
	Insufficient grease	Apply grease sparingly to seal or o-ring

When removing the shaft from the pipette body, make sure the spring, seal and o-ring do not detach from the piston, especially on the smaller models. Be careful not to bend the piston on these small models.
Recalibration of Pipet-Lite PL is only required when the piston is replaced.

1.11 Service, Calibration and Repair

It is recommended to use only genuine Rainin replacement parts such as seals, o-rings, retainers and shafts. It is NOT necessary to recalibrate the pipette after changing the seal, o-ring, or shaft. Recalibration of the pipette is only necessary when the piston is replaced, and should be done only by qualified factory-trained personnel in a Rainin approved facility.

For pipettes under warranty, please note that the warranty will be voided if the pipette has been damaged as a result of physical or chemical abuse, or if the pipette has been repaired or recalibrated by any service facility which is not authorized by Rainin. In the US, call 800-543-4030 for service. Service is also available outside the US.
See www.mt.com/rainin for more information.

Acids and Corrosives

Extensive contact with corrosive fumes may result in premature seal wear and damage to the piston. Exposure of the internal components to corrosive aerosols and fumes may be reduced by using Rainin tips with aerosol barrier filters.

After using concentrated acids or corrosive solutions, you can disassemble Pipet-Lite XLS and inspect and clean the piston assembly, shaft and seal / o-ring with distilled water. Use extreme care on the 2 µL and 10 µL models to avoid damaging the small diameter piston, or losing small items such as seals. Dry all components thoroughly and reassemble.

2. Pipet-Lite PL+ Multichannel Pipettes 8 and 12-channel models

2.1 Introduction

Pipet-Lite PL+ multichannel pipettes are based on the Pipet-Lite PL single-channel pipette and use the patented LTS LiteTouch Tip Ejection System.

Two versions of the Multichannel Pipet-Lite PL+ are available: 8-channel and 12-channel.

Volume ranges for multichannel models

Volume	Adjustable Range µL	Recommended Range µL	Increment µL
10 µL	0 to 10	0.5 to 10	0.02
20 µL	0 to 20	2 to 20	0.02
50 µL	0 to 50	5 to 50	0.05
200 µL	0 to 200	20 to 200	0.2
300 µL	0 to 300	20 to 300	0.5

2.2 Tip Selection

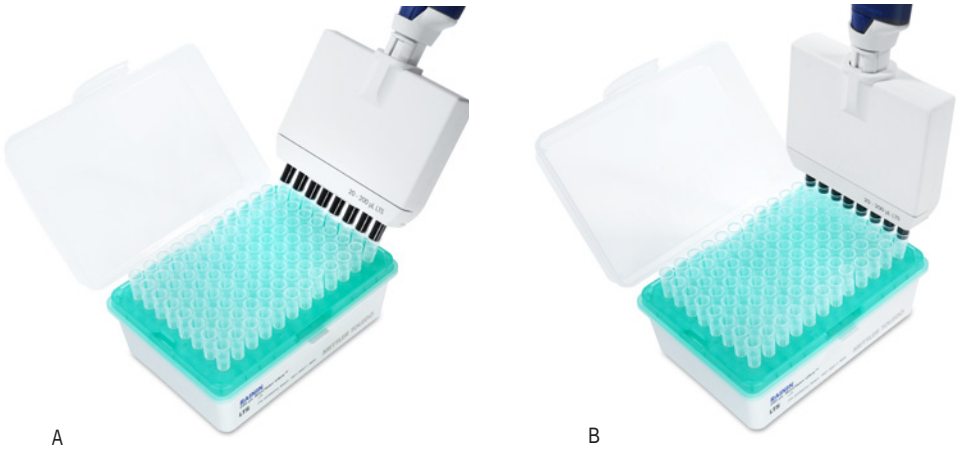
Pipet-Lite PL+ multichannel pipettes use Rainin LTS tips.
10 µL, 20 µL models: 20 µL LTS tips
50 µL, 200 µL models: 250 µL LTS tips
300 µL: 300 µL LTS tips

LTS tips have a cylindrical cross-section with a well-defined seal ring, thin wall, and positive stop. They seal properly on the shaft and cannot be jammed or forced too far onto the shaft nozzles, and provide absolutely consistent sample pickup across all channels.

Figure 9: Pipet-Lite PL+ 8-channel model

2.3 Mounting LTS Tips: 8- and 12-channel

Mounting racked LTS tips on L8 and L12 pipettes is simple. First align the shaft nozzles into the row of tips, holding the pipette at an angle. (Figure 10A). Position the pipette upright and press the nozzles into the tips until the "positive stop" is reached. (Figure 10B). The tips are now mounted with proper sealing. You do not need to hand-tighten, use heavy pressure, or "rock" the nozzles onto the tips to obtain a good seal.



A B

Figure 10: Mounting racked LTS Tips

2.4 Tip Immersion Depth

The recommended depth for tip insertion is shown in the table below.

Models	Immersion Depth
10 µL, 20 µL, 50 µL	2 - 3 mm
200 µL, 300 µL	3 - 6 mm

2.5 Positioning the Liquid End Manifold

The liquid end manifold can be rotated to any angle for convenience when filling plates. You do not need to loosen the coupling nut.

3 Specifications

These manufacturer's specifications should be used as guidelines when establishing your own performance specification.

Single Channel Models

Model	Volume µL	Increment µL	Systematic Error		Random Error	
			%	µL (±)	%	µL (<)
2 µL	0.2	0.002	12	0.024	6	0.012
	1		2.7	0.027	1.3	0.013
	2		1.5	0.03	0.7	0.014
10 µL	1	0.02	2.5	0.025	1.2	0.012
	5		1.5	0.075	0.6	0.03
	10		1	0.1	0.4	0.04
20 µL	2	0.02	7.5	0.15	2	0.04
	10		1.5	0.15	0.5	0.05
	20		1	0.2	0.3	0.06
100 µL	10	0.2	3.5	0.35	1	0.1
	50		0.8	0.4	0.24	0.12
	100		0.8	0.8	0.15	0.15
200 µL	20	0.2	2.5	0.5	1	0.2
	100		0.8	0.8	0.25	0.25
	200		0.8	1.6	0.15	0.3
1000 µL	100	2	3	3	0.6	0.6
	500		0.8	4	0.2	1
	1000		0.8	8	0.15	1.5
5000 µL	500	5	2.4	12	0.6	3
	2500		0.6	15	0.2	5
	5000		0.6	30	0.16	8
10 mL	1 mL	20	5	50	0.6	6
	5 mL		1	50	0.2	10
	10 mL		0.6	60	0.16	16

Multichannel Models

Model	Volume µL	Increment µL	Systematic Error		Random Error	
			%	µL (±)	%	µL (<)
10 µL	1	0.02	4	0.04	5	0.05
	5		1.5	0.075	1.5	0.075
	10		1	0.1	0.5	0.05
20 µL	2	0.02	7.5	0.15	4	0.08
	10		1.5	0.15	1.5	0.15
	20		1	0.2	0.5	0.1
50 µL	5	0.05	3.5	0.18	2	0.1
	25		1.2	0.3	0.5	0.125
	50		0.8	0.4	0.4	0.2
200 µL	20	0.2	2.5	0.5	1.2	0.24
	100		0.8	0.8	0.25	0.25
	200		0.8	1.6	0.3	0.6
300 µL	30	0.5	2.5	0.75	1.5	0.45
	150		0.8	1.2	0.3	0.45
	300		0.8	2.4	0.25	0.75

Specifications are subject to change without notice.

For more information on good pipetting practices, including lab posters, visit **www.mt.com/gpp**

Limited Warranty

See the Limted Warranty and limitations of Liability Statement. Please complete and return the Warranty registration card on receipt of your pipette.

Rainin pipettes are calibrated with Rainin tips. To assure excellent reproducibility and performance, use only Rainin tips as recommended in this manual. Specified performant is guaranteed only when Rainin tips are used.

www.mt.com/rainin

For more information

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